Investigatory Voice Biometrics Committee Report

Development of a Draft Type-11 Voice Record

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Version 2.1

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Contents

Summary

The idea of automated and semi-automated (human-assisted) speaker recognition for forensic, investigatory and related applications goes back to World War II. Considerable government monies have been spent over the intervening 70 years in developing technical approaches, speech databases and testing programs. Missing from these efforts, however, has been the development of a forensic voice recording interchange format comparable to the interchange formats that currently exist for fingerprint, palmprint, face, iris, scar/mark/tattoo, and DNA data used for the purpose of human recognition. The Investigatory Voice Biometrics Committee (IVBC) was created by the FBI in early 2011 to take on the task of initiating development of a voice recording format to allow the interchange of voice data within the ANSI/NIST ITL forensic biometric data interchange standard [1], the current *de facto* international standard for exchange of biometric data for law enforcement and national security applications. This document is a report on those efforts and contains the first draft of a voice recording interchange format, which will be known as a "Type-11 Voice Record" within the parlance of the ANSI/NIST ITL community. We emphasize that the output of the IVBC is only intended to serve as the starting point in the Type-11 development process and is intended to inform an ANSI/NIST ITL:2011 "Supplement" that will go through all of the canvass processes adopted for ANSI/NIST ITL development and acceptance (See www.nist.gov/itl/iad/ig/ansi_standard-canvass.cfm). This draft Type-11 record is modeled roughly after existing record types in the 2011 version of the ANSI/NIST standard but, unlike other record types, will allow exchange of both digital and analog data using both electronic and physical media. The Type-11 record is designed to be used within ANSI/NIST formatted transactions for law enforcement and homeland security-type speaker recognition and other closely-related speech applications. It is not specifically designed for speaker recognition within logical or physical access control, "time-and-attendance", point-of-sale, or other consumer applications. This standard does not specify which techniques will be used in any human-assisted, automated or mixed voice processing application and does not specify how findings of forensic voice comparisons will be quantified or recorded. It is the intent of the IVBC to submit this draft into the ANSI/NIST ITL process in mid-2012 as a proposed starting point for the development of a speaker recognition supplement to the existing 2011 version of the standard.

Introduction

Speaker recognition presents some unique challenges not found in other forms of human recognition, such as fingerprint, iris or face. The human voice, generally carrying both speech and non-speech sounds, propagates varying distances through air or another medium to reach acoustic transducers (usually microphones) of varying amplitude and phase response. Consequently, a voice recording will confound elements of the original vocalization with characteristics of the propagation path and transduction mechanism. We will consider a "speaker" to be any person producing any voice sounds ("vocalizations"), although with the current state of technology, speaker recognition usually requires vocalizations containing speech

(linguistic content). We will also consider an automated interlocutor to be a "speaker" in this context, although such a speaker will not be the primary subject of a speaker recognition transaction.

When voice sounds carry speech, that speech usually occurs within a social context involving more than one speaker. Consequently, a speech signal collected *in situ* will generally contain the voices of multiple speakers, each voice signal with its own transfer function between the speaker and the transducer. Segmenting and de-conflicting overlapped voice signals ("speaker separation") through automation is currently an unsolved problem in the general case, thus implying that many operational applications of speaker recognition technology will involve audio recordings containing multiple speakers and multiple acoustic transmission paths.

The ANSI/NIST ITL standard was originally developed for the interchange of fingerprint data, whether collected from latent prints lifted from crime scenes, scanned off of ink-based fingerprint cards or taken directly from electronic "live" scanners. The standard, therefore, is explicitly restricted to cases where, "All records in a transaction shall pertain to a single subject". This restriction presents special challenges for use of the standard for interchange of natural voice signals, containing both speech and non-speech sounds, collected in a social, multi-speaker context and stored either digitally or in analog form and either electronically or on physical media. Therefore, a voice record type will have to accommodate: 1) bespoke recordings of single speaker voice signals for the specific purpose of speaker recognition; 2) conversational and interview scenario voice signals, digitized and segmented into clips, or "snips", restricted to speech from the single speaker of interest (the voice data subject); 3) unsegmented natural voice signals on digital or analog media, with or without an accompanying timing diary of the segments attributable to speech from the single speaker of interest; 4) unannotated speech segment(s) for input to annotation work-flow tools. In all cases, the voice samples referred to in the Type-11 record must accommodate signals collected non-continuously and stored in multiple segments, a requirement that has been encountered before in other ANSI/NIST record types. For example, the Type-14 record (variable-resolution fingerprint images) has the capacity to carry multiple fingerprint samples in one image with segment boundary information for each finger in the image, albeit from a single individual, and serves as a model in this regard.

There are other unique challenges facing a speaker recognition standard:

- Voice signals generally contain both speech and non-speech elements, either of which might be useful in speaker recognition applications.
- Unlike other modalities, voice signals are collected in time, not spatial, dimensions and will not have a single "time of collection".
- In mobile applications, even a single segment of a voice signal may not be linkable to a single geographic location.
- Unlike other forms of biometric recognition, voice signals containing speech have direct informational content. Even if stripped of all personally identifiable information including the acoustic content itself, the information in the speech signals may require protection for privacy or security reasons.

- Unlike other modalities, voice signals may reflect the social and behavioral conditions of the collection environment, including the relationship between the data subject and any interlocutors.

Consequently, creating a Type-11record for voice signal transmission with the ANSI/NIST ITL context is more complicated than simply copying an existing ANSI/NIST record type and changing terminology (i.e., substituting "voice" for "fingerprint" and "signal" for "image") as has been often suggested by the standards community. In the case of DNA Type-18 records, ANSI/NIST has previously shown significant flexibility in dealing with record types which carry non-spatial data with significant content beyond that required for the recognition of individuals. Consequently, we fully expect that the current ANSI/NIST structure can flex to accommodate the "nuisances" of voice.

Investigatory Voice Committee Membership

Joseph Campbell, MIT
Carson Dayley, FBI
Craig Greenberg, NIST
Peter Higgins, Consultant
Alysha Jeans, FBI
Ryan Lewis, FBI
Jim Loudermilk, FBI
Kenneth Marr, FBI
Alvin Martin, Consultant
Hirotaka Nakasone, FBI
Mark Przybocki, NIST (IVBC Chair)
Vince Stanford, NIST
Pedro Torres-Carrasquillo, MIT
James Wayman, Consultant
Bradford Wing, NIST

Definitions of Specialized Terms Used in this Document

Acoustic signal
Pressure waves in a media with information content.

Audio signal
Information in analog or digital form that contains acoustic content (voice or otherwise).

Audio recording
A stored audio signal capable of being transduced into an audible acoustic signal.
Note: By "audible" we mean "capable of being heard by humans".

Automated Fingerprint Identification System (AFIS)
Any system designed for the machine comparison of fingerprint images, with or without human assistance.

Contemporaneous
Existing at or occurring at the same period of time.
Note: In this record type, the phrase "contemporaneous capture of a voice signal" indicates recording of the voice signal at the time of the speaker vocalization.

Diary
List giving the start and stop times of speech segments of interest pertaining to the primary data subject within the voice signal.

Note: Diarization of segments from multiple speakers requires multiple Type-11 records, one for each speaker.

International Biometric Industry Association (IBIA)
Algorithm registration authority which maintains the Vendor Registry of Biometric Organizations

Known Voice Signal
A voice signal from an individual who has been "identified", or individuated in a way that allows linking to additional, available information about that individual.

Metadata
Documentation about the voice signal necessary or helpful in supporting the types of speaker recognition transactions likely to be encountered in law enforcement and homeland security applications.

Physical medium
Any external storage material of the voice signal and content information in either analog or digital form. Examples include reel-to-reel recording tape, cassette tape, Compact Disc, phonograph record.

Quality
An estimate of the usefulness of a voice signal for the purpose of speaker recognition.

Questioned Voice Signal
A voice signal from an individual who is unknown and cannot currently be linked to any previously encountered individual.

Note: The task of speaker identification is to link a questioned voice sample to a known voice sample through determination of a common speaker.

Record (n)
An ANSI/NIST biometric data format type, in its entirety, within an ANSI/NIST transaction.

Note 1:In this document, this will be the Type-11 record unless otherwise stated.

Note 2: An ANSI/NIST transaction might contain multiple Type-11 records, as well as other record types, including the mandatory Type-1 record. In the current FBI Electronic Biometric Transmission Standard (EBTS), a transaction will also contain the mandatory Type-2 record.

Record (v)

The act of converting an acoustic voice signal directly from an individual into a storage media, perhaps through contemporaneous, intermediate (transient) signal types.

Note: We maintain this definition because of its entrenchment in natural language use. Consequently, a record (n) is not recorded, it is created.

Note: Transcoding is the term used for further processing of the voice signal and any digital or analog representation of that signal.

Record creation

The act of creating a Type-11 record pertaining to a voice signal(s).

Recording (n)

A stored acoustic signal in either analog or digital form.

Redaction

Over-writing of segments of a voice signal for the purpose of masking speech content in a way that does not disrupt the time record of the original recording.

Snip (n)

A segment of a voice signal extracted from a larger voice recording.

Note: Also called a "clip" or a "cut" in some communities.

Snip (v)

Extraction of segments of a voice signal in a way that disrupts the continuity and time record of the original recording.

Speaker

A vocalizing human, whether or not the vocalizations contain speech.

Note: An interlocutor might be a synthesized voice, which can be considered a "speaker" within the context of this report.

Speech

Audible vocalizations made with the intent of communicating information through linguistic content.

Note 1: Nonsensical vocalizations with linguistic content will be considered as speech.

Note 2: Speech can be made by humans, by machine synthesizers, or by other means.

Subject of the Type-11 record

The person to whom the voice data in the Type-11 record applies.

Note: Because a transaction can include Type-11 records for interlocutors and others not named as the subject of the transaction, the subject of the Type-11 record need not be the subject of the transaction.

Subject of the transaction

The person to whom the ANSI/NIST ITL transaction applies.

Note: The primary or only speaker in a Type-11 record need not be the subject of the transaction.

Transaction
A transmission between sites or agencies comprised of records, types of which are defined in the ANSI/NIST ITL 1-2011 [1].

Note: An ANSI/NIST-ITL transaction is called a file in Traditional encoding and an Exchange Package in XML encoding.

Transcoding
Any transfer, compression, manipulation, re-formatting or re-storage of the original recorded material.

Note 1: Transcoding is not the first recording of the acoustic signal.

Note 2: Transcoding can be lossless or lossy.

Voice data file
The digital, encoded file primarily containing the sounds of vocalizations of both speech and non-speech content, convertible to an acoustic signal replicating the original acoustic signal.

Note 1: A voice data file is extracted from an audio recording, but not all audio recordings contain voice signals and not all voice data is speech.

Note 2: Analog tapes and phonograph records contain voice signals but not voice data files.

Voice recording
A signal, stored on a digital or analog medium, of vocalizations containing both speech and non-speech content.

Voice signal subject
The single speaker of interest in the Type-11 record.

Note 1: This may not be the subject of the transaction.

Note 2: The voice signal subject may be known or unknown.

Abbreviations Used in the Report

Abbreviations for Type-11 fields and items are not included in this list.

AFIS – Automated fingerprint identification system
ANSI – American National Standards Institute
ANSI/NIST-ITL – NIST Special Publication 500-290: The American National Standard for Information Systems–Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information.
CJIS – Criminal Justice Information Services
DOD – Department of Defense
DNA – Deoxyribonucleic acid
EBTS – Electronic Biometric Transmission Specification
FAVIAU – FBI Forensic Audio, Video and Image Analysis Unit.
FBI – Federal Bureau of Investigation

FO – FBI field office
IBIA – International Biometric Industry Association
IVBC – Interagency Voice Biometric Committee
ITL – The NIST Information Technology Laboratory
MIT – Massachusetts Institute of Technology
NIST – National Institute of Standards and Technology
POC – Point of contact
TOT – Type of transaction
XML – Extensible Markup Language

Relationship Between the Type-11 Record and Other Record Types and Documents

A Type-11 record would never be used in isolation, but would be placed in the context of an ANSI/NIST ITL transaction, which would by necessity contain at least the mandatory Type-1 record. A single ANSI/NIST transaction might contain several Type-11 records: for example, one or more Type-11 records of "Known" voice signals perhaps from different individuals and one or more Type-11 records with "Questioned" signals. In an FBI EBTS transaction, there will be a separate Type-2 record for each "Questioned" and each "Known" speaker. Further, the specifics of the implementation of the standard to support various types of transactions between agencies, including the mapping of subjects identified in Type-2 records to their roles in voice recordings, would be specified in "exchange agreements" such as the Electronic Biometric Transmission Specification (EBTS) [2] used by the FBI and DOD. The EBTS specifies by Type of Transaction (TOT) which fields and record types will be mandatory, which optional and which disallowed.

The Type-11 record will also utilize the new Type-20 record included in the 2011 version of ANSI/NIST ITL. Type-20 is a broadly defined record type for unedited and unmodified source data from which data subject-specific, segmented biometric data can be derived. The Type-11 record can take advantage of the availability of the Type-20 records as a method for transmitting unedited or unmodified voice signals when in digital form.

For EBTS users, development of the Type-11 record must take place within the context of the existing Type-1, Type-2 and Type-20 records and the current EBTS, all of which are living documents subject to modification. Domains of interest, such as the Criminal Justice Information Services Division of the FBI (CJIS), may in the future update their EBTS specification to reflect use of Type-11 records within their domains.

This report of the IVBC contains no information about recording or transmission "best practices", although we acknowledge the extreme importance of these issues. It is the intention of the committee to develop such documents in the future.

Some Types of Transactions Supported by a Type-11 Record

The IVBC considered various types of voice signal transactions currently supported and anticipated by the FBI. The committee recommends that the current FBI EBTS document be updated to support these voice signal transactions. This committee also recommends that a best practices document for use by the FBI EBTS community of interest be developed describing how to use Type-11 and other record types for commonly expected scenarios of operation. This work can be accomplished at a speed determined appropriate by EBTS community.

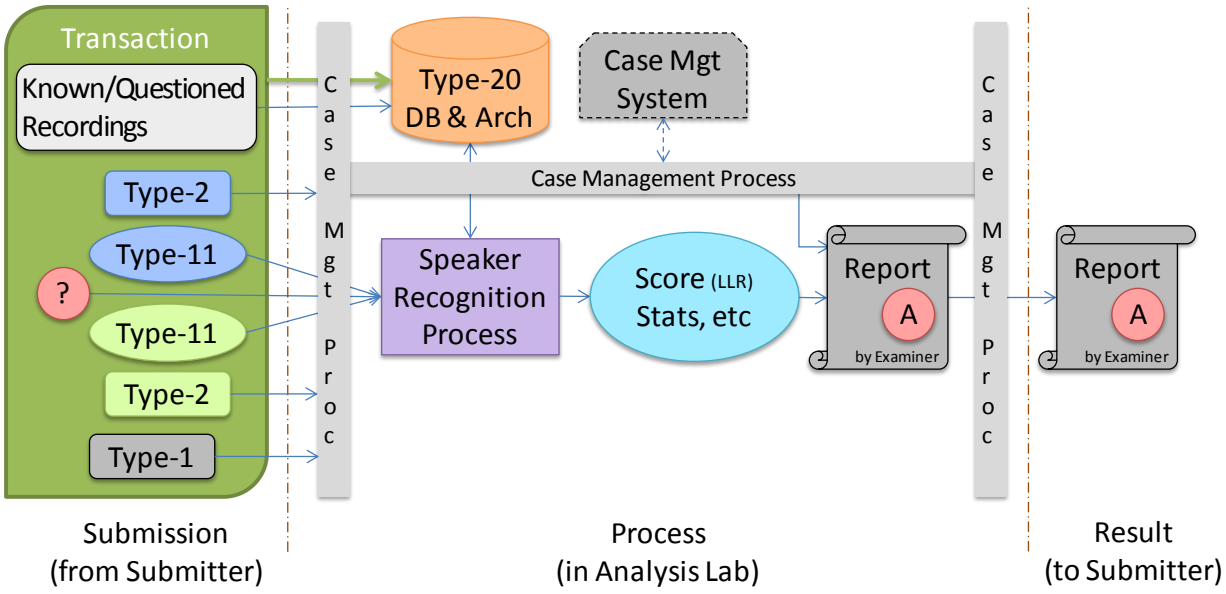
The Type-1 record within an ANSI/NIST transaction contains Field 1.004 for specifying the "type of transaction" (TOT) – the purpose for which the transaction was generated. The committee identified a partial list of potential "types of transactions" that might be implemented using this record type:

1. Voice model creation and storage for a known speaker
2. Voice model creation and storage for an unknown speaker
3. Comparison of the speakers in two audio recordings
4. Comparison of the voice in an audio recording to the voice models from a list of known speakers
5. Converting an analog audio recording into digitized voice data file(s)
6. Duplicating or transcoding an audio recording
7. Finding and isolating voice signals in an audio recording
8. Finding and isolating speech signals within an audio recording
9. Determination of the distinct speakers in an audio recording
10. Indexing an audio recording into voice segments attributable to distinct speakers
11. Creation of a diary, attributing speech segments to a speaker of interest
12. Creation of word or phone level transcriptions, in the language spoken, of segments of speech attributable to a single speaker
13. Redaction of an audio recording to remove sensitive speech segments
14. Snipping of an audio recording to remove segments of non-speech, speech not attributable to the subject of interest, or speech not of interest to the transaction
15. Enhancing the speech segments in an audio recording for return to the submitting agency for use in human-assisted or automated speaker recognition applications
16. Authentication of an audio recording as containing the continuous speech of a single speaker without deletions or insertions
17. Transfer voice recording to an archive for permanent or time-limited storage

The TOT field in a Type-1 record of an ANSI/NIST transaction may also be left blank to indicate that the submitting agency is asking for a transaction type not formally listed. The above partial list of potential "TOTs" will have to be further refined to determine which transaction types require responses from the receiving agency and which do not

Figure 1 illustrates the work-flow process of TOT 3 above: the comparison of the speakers in two Type-11 records to answer the question from a Submitter (illustrated as "?"), "Are the two voice segments of interest in the two records from the same human source?" The question is

addressed (with appropriate metadata, context, analysis, and caveats) by a certified examiner in a report. The methodology by which the examiner addresses the question is not specified in this committee report, as the Type-11 record is intended to be methodology independent.



Records
Type-1: Mandatory record submitted with each transaction, "transaction header information"
Type-2: Transaction related data, e.g., subject's name and other biographic information, reason for booking, any charges, etc.
Type-11: Voice data and voice metadata for the subject in corresponding Type-2 ("voice data" can be marks for the subject in the original audio stored))
Type-20: Repository of original data if in digital format (original format, nonmanipulated, and unprocessed), which includes raw evidence (without redaction).
Type-xx: Other record types can be transferred that might not be used in the speaker recognition process, e.g., photo of subject, signed papers, etc.

Figure 1. Canonical speaker comparison example, TOT number 3 (comparison of the speakers in two audio recordings). The question "?" ("Does the question voice recording share the same source as a known voice recording?") is addressed (with appropriate metadata, context, analysis, and caveats) by a certified examiner in a report delivered externally.

The Type-11 voice record type must support all of the TOTs listed above, even if originating from submitting agencies with little or no capability in digitizing audio signals or in speech analysis, as well as inter- and intra-laboratory transmissions on fully or partially processed voice recordings. Further, the type of transactions ultimately to be performed on the voice recording might not be fully known at the time the Type-11 record is created. Therefore, the voice recordings referred to in the Type-11 record must be accompanied by documentation, when available, to support a very wide variety of potential transactions. In this report, this documentation will be referred to as "metadata" and will be of four basic types:

- Administrative metadata: who initiated the transaction, for what purpose, and with what authority?
- Speaker metadata: what is known about the speaker of interest and their physical and psychological condition at the time of the speech?
- Content metadata: what language is being spoken, when was the original content spoken under what conditions, and what content information is available that might help in the speaker recognition process?

- Audio technology metadata: how was the voice signal collected, stored and processed and what technical parameters will help in the faithful reproduction and analysis of the signal within the storage medium?

Some of this metadata, such as the time and date of the original recording, might only be known from external sources. Some of the metadata, such as the language being spoken, might be discernible from the voice recording itself. Much of the metadata might not be known or available to the various agencies creating the audio recording, the Type-11 record and the ANSI/NIST transaction. All of the metadata, however, could be useful in the processing of the audio recording given the potential for widely varying transactions and, therefore, should be made readily available to the receiving agency without requiring the reprocessing of the audio recording. Consequently, our goal is to create as many non-redundant metadata fields as possible to permit transmission of documentation of potential future interest, even if the metadata could potentially be recovered from the audio recording itself. Most of these fields will be optional because much of the potentially relevant metadata may be unknown to the various agencies involved in the transaction.

Scope of the Type-11 Record

This record type is intended to support the transmission of audio recordings containing speech by one or more speakers and noise (data of no interest to the transaction, whether speech, non-speech voice data, or non-voice data) for forensic and investigatory purposes in the context of an ANSI/NIST ITL transaction pertaining to a single, perhaps unknown, individual. These transmissions are intended to support transactions related to detecting and recognizing speakers, extracting from an audio recording speech segments attributable to a single speaker, and linking speech segments by speaker, whether these functions are to be accomplished through automated means (computers), human experts, or hybrid human-computer systems. Related functions, such as redaction, authentication, phonetic transcription and enhancement, while also supported, are not the primary concern of this record type. Certainly, audio recordings supporting these related functions may be transmitted via Type-11 records. This standard does not specify which techniques will be used in any human expert, automated or hybrid voice processing application and does not specify the form of the examination report. The committee decided that all details of the examination report, including its transmission to relevant agencies, will be left for future development. This record type, without modification, does not support streaming transactions. Although not designed for use in logical or physical access control, “time-and-attendance”, “point-of-sale”, or other consumer or commercial applications, nothing in this record type should be construed as preventing its application in these or other transaction types not specifically addressed here. This record does not define the transmission of features or models extracted from voice data. This record type does not restrict the media by which the audio recording may be transmitted, but will support digital transmission of transaction information regardless of the audio recording media. A best practices document for voice recording will be created in a future effort.

Source Documents

1. ANSI/NIST ITL 1-2011, "Data Format for the Interchange of Fingerprint, Facial & Other Biometric Information", NIST Special Publication 500-290, November, 2011
2. "Electronic Biometric Transmission Specification", Criminal Justice Information Services Division, IAFIS-DOC 01078-9.2, 9 December, 2011
3. Collaborative Digitization Program, Digital Audio Working Group, "Digital Audio Best Practices", version 2.1, October, 2006, http://ucblibraries.colorado.edu/systems/digitalinitiatives/docs/digital-audio-bp.pdf
4. Audio Engineering Society, "AES standard for audio metadata - Audio object structures for preservation and restoration", AES57-2011, Sept. 21, 2011
5. Audio Engineering Society, "AES standard for audio metadata -Core audio metadata", AES60-2011, Sept. 22, 2011

Administrative Metadata Requirements

The IVBC identified the following requirements for administrative metadata for transactions containing audio recordings:

Requirement 1: Point-of-Contact (POC) Name
Requirement 2: Agency
Requirement 3: Phone number
Requirement 4: Originating agency case identifier
Requirement 5: Transaction identifier
Requirement 6: Embedded case identifier
Requirement 7: Email address of submitter
Requirement 8: Alternative POC
Requirement 9: User defined fields, such as "FBI/non-FBI case"

The above information is required to promote traceability of the audio recordings. There are at least three levels of traceability – linking back to the submitting, compiling/post-processing and collecting agencies. It is possible for all three agencies to be the same in some transactions, but they will often be different.

The submitting agency is one approved to submit a transaction to a receiving agency for the processing requested in the "Type of Transaction" (TOT) field within the Type-1 record. Within the ANSI/NIST structure, the submitting agency is denoted in Type-1 Field 1.008 (Originating Agency/ORI), which contains the identifying number of the agency that served as a channel for the request to the receiving agency for processing. The name of the ORI is contained in Field 1.017, Agency Names/ANM, information item originating agency name/OAN. Other record Types (Type-XX) also include Fields XX.004 (Submitting Agency/SRC) and XX.993 (Source agency name / SAN). Within the U.S. law enforcement domain of interest, the relevant

EBTSs establish that the ORI must be from an National Crime Information Center (NCIC)-authorized agency.

Type-18 (DNA) contains a more comprehensive Field 18.003 (DNA Laboratory Setting/DLS) that will serve here as a model for metadata on the lab or agency that created the voice recording.

As defined in the FBI EBTS (although not in the ANSI/NIST ITL document itself), the agency that compiled the raw data into a search transaction is identified in the Type-2 Field 2.073 (Controlling Agency Identifier/CRI). By FBI EBTS, the CRI itself has three levels and the ORI and top-level CRI are usually the same[1].

The collecting agency is not specified in either Type-1 or Type-2 (as defined by EBTS) records. The original source of the voice recording, which might be a local law enforcement office, 911 call center, or other non-law enforcement group, will be included specifically within the Type-11 record as Field 11.004 (Voice Laboratory Setting/VLS), modeled after Field 18.003 (DNA Laboratory Setting/DLS) and after Field 19.004 (Plantar images: source agency/SRC)

We can map these three levels as follows.
Submitting agency – ORI Field 1.008; ANM_OAN Field 1.017
Compiling agency – CRI Field 2.073
Collecting agency – VLS Field 11.004; SAN Field 11.993

This complex system is used where a local (county or city) agency has an AFIS that submits a transaction to the state, which is then submitted by the state to the FBI. All of this structure will have to be re-thought for voice and relevant policies established.

So, with regard to the specific metadata requirements identified above, the IVBC has identified the following responses in FBI-centric applications:

Response to requirement 1: Neither the current Type-1 nor the FBI EBTS-defined Type-2 records allow for inclusion of the agency responsible for the collection of an audio or voice recording. However, Type-19 (plantar images) Field 19.004 contains additional information about the original source (agency, non-agency) of the data, including multiple subfields about the source. Accordingly, for the Type-11 record, information about the original source of the audio recording, as well as the information identified in Administrative Metadata Requirement 1 above regarding the specific individual or individuals responsible for the collection and serving as a Point of Contact, will be a subfield of Field 11.004.

Response to requirement 2: By FBI EBTS definition, the originating agency case ID is Field 2.009 and thus does not have to be defined as part of the Type-11 record.

[1] The only time these would be different in an FBI EBTS-based transaction is for a user that is authorized by the State Identification Bureau (SIB) to submit friction ridge searches directly to CJIS without passing through the state system. In this case the ORI would be for the state, while the top-level CRI would be for the agency directly submitting the transaction

Response to requirement 3: Phone number of the original source would be an additional subfield of 11.004

Response to requirements 4 and 5: Transaction ID is Field 1.009 Transaction control number/TCN. This can be the case ID of the originating agency. Additionally, Type-1 Field 1.010 Transaction control reference / TCR may be used to reference the TCN of a previous transaction involving an inquiry or other action that required a response.

Response to requirement 6: Provision for embedding an FBI file number is made by the FBI EBTS in Field 2.003. Field 2.012 is for the "FBI Latent Case Number". These numbers are in a format controlled by the FBI Latent fingerprint Section, so a corollary set of numbers will have to be established for voice records. The various EBTS controlling authorities will have to add a field in Type-2 records for voice cases.

Response to requirement 7: As there is no provision currently within Type-1 for an email address or alternate POC. However, Field 18.003 contains parallel information about the DNA laboratory processing the data. For voice, this information would be placed in subfields of 11.004.

Response to requirement 8: An alternate point of contact can be specified in a subfield of 11.004.

Response to requirement 9: The record type will accommodate user-defined fields as defined in exchange agreements.

Also included in Type-1 is Field 1.006, which gives a priority (an integer 1…9) by the originating agency for the processing of the data. The lower the number, the higher the priority, as per the ANSI/NIST Standard. This field will be of interest in voice data transactions. Receiving laboratories will have to provide guidance on their priority schema, perhaps in the appropriate EBTS.

The security classification of both data and metadata is a concern for all ANSI/NIST record types and is being addressed by US government committees through the use of a uniform "wrapper" to the records to identify classification level. Consequently, security classification issues will not be addressed in this document.

Speaker and Content Metadata Requirements

The IVBC has identified some of the requirements for metadata about the data subject and the subject's speech, which are listed below. We recognize that the distinction between "long-term" and "short-term" attributes might be elusive in many cases.

1. Identifier
2. Long-term Attributes
    a. gender

   b. accent[2]
   c. date of birth
   d. native language/language biography
   e. educational level
   f. primary location where data subject grew up
   g. speech pathology (may be intermittent)
3. Short-term Attributes
   a. Impairment/intoxication
   b. Language being spoken
   c. Language proficiency
   d. Health status
   e. Intelligibility
   f. Style (public speech, conversation, read, prompted, interview, other)
   g. Emotional state/vocal effort
   h. Citizenship

In the case of Type-11 records containing speech from the subject of the transaction, three of these items are already included in EBTS-defined Type-2 fields: identifier (subject name) – 2.018; gender(sex) – 2.024; date of birth – 2.022; citizenship -- 2.021.

In the case of Type-11 records with speech of persons not the subject of the transaction, additional Type-2 records will be added to the transaction, but without altering the requirement that the transaction as a whole must pertain to a single subject.

The ANSI/NIST ITL standard states that Type-2 Fields 2.003 and above are user defined fields. "Individual fields shall conform to the specifications set forth by the agency to which the transmission is being sent…." This implies that we might specify additional speaker metadata requirements as specific Type-2 fields to be added to the existing fields defined in the appropriate EBTS specifications. However, there is also precedence in Type-18 records (DNA) for donor specific information in Field 18.006. A logical approach would be to place the long-term attributes of the speaker into Type-2 fields and place the short-term attributes as Type-2 subfields because those attributes are only pertinent to the transaction at hand. Consequently, we could put:

2.X00 NL native language
2.X01 EL educational level
2.X02 UP geographical location of first 12 years of life
2.X03 SI speech impairment

within the Type-2 record definition of the FBI EBTS document, while defining the remaining speaker and content metadata within fields of the Type-11 record.

[2] Although this was an original requirement of the IVBC, we have been unable to find a metric or a means of codification of "accent". Consequently, accent is not included in any field of the proposed Type-11 record.

The current EBTS defines a field (2.037 RFP) for "reason fingerprinted". Some implementations of the ANSI/NIST standard (e.g., the Afghan EBTS) have simply changed this field to "reason enrolled". The current FBI CJIS EBTS still uses fingerprints as identity foundations. The submittal of facial images from known collections, for instance, are always coupled with a set of fingerprints to ensure the facial image is linked to the correct FBI number. It is anticipated that many voice submittals will not include fingerprints. Consequently, we could define within the FBI EBTS:

2.X04 RE reason enrolled

This field might additionally be used to contain the legal justification for the existence of the voice data record (i.e., Title III Omnibus Crime Control and Safe Street Act of 1968; Title 50 of the Foreign Intelligence Surveillance Act of 1978). Alternatively, a Type-21 record within the transaction could be used to contain images of the necessary legal documents, such as court orders, supporting the recording.

Audio Technology Metadata Requirements

The IVBC has identified the following requirements for metadata about the audio technology used to record the voice data:

1. Overall/Preliminary signal quality
2. Duration of signal measured in seconds
3. Duration of signal measured in samples
4. Encoding/container format
5. Sampling rate
6. Bit depth (may be encoding dependent)
7. Recording method (conversion of temporary to permanent storage)
8. Time/date of recording
9. Where recorded
10. Type of recorder
11. Make/model/serial number of recorder
12. Transducer characteristics
13. Transducer type (array, earbud, wire, microphone, handset, speaker phone,…)
14. Channel information

All of these elements would most naturally be placed within fields of the Type-11 record and have been included in the Type-11 draft.

Audit Logs

The Record Type-98, "Information assurance record", accommodates special data protection procedures to ensure the integrity of the transmitted data and allows for the maintenance of an audit log. Field 98.900 (Audit log / ALF) may be used to indicate how and why a transaction was modified. The ALF is of particular use when a transaction is sent from one location to a second, where additional information is included, before sending the transaction to a final destination for processing. In the case of a voice recording, the ALF will be used to indicate how and why redaction, snipping and diarization information was created or edited.(See ANSI/ NIST ITL 2011, Section 8.22)

An operational example might be of a local police lab sending a transaction with multiple Type-11 records, containing voice signals of both known and unknown persons, to the appropriate FBI Field Office (FO) where additional information would be added, such as an FBI file number. The FO might also redact case-sensitive speech from the voice recordings referenced in the Type-11 records before sending the transaction to another FBI forensic unit for additional redaction. The forensic unit would then forward the updated transaction to the FBI Forensic Audio, Video and Image Analysis Unit (FAVIAU). FAVIAU might create diaries of the questioned voice samples in the Type-11 records, indicating which segments were from the speaker of interest, as recorded in a known voice sample in additional Type-11 records. The diaries might be revised after additional supervisory review. All of this would be documented in a Type-98 record included in the evolving transaction.

In contrast to the Type-98 record, which presents an audit log at the level of the entire transaction, Field 11.902, which is modeled after XX.902 fields in other record types, provides an audit log at the level of the Type-11 record. Field 11.902 lists the operations, such as redaction, snipping or diarization, performed on the original voice recording in order to prepare it for inclusion in the record type. See Section 7.4.1 of the ANSI/NIST ITL standard.

General Organization of the Type-11 Record

The Type-11 record is organized into 6 parts: I) mandatory fields; II) initial global fields, applying to the entire voice data record; III) indication of presence and definition of segments within the voice data record; IV) fields applying to the individual segments; V) additional global fields modeled on other Types in the ANSI/NIST standard; VI) fields containing or pointing to the voice recording.

I. Mandatory fields:
   01 Record header
   02 Information designation character
II. The initial global fields are:
   03 Audio object descriptor (internal or external digital file, external physical media containing digital/analog/unknown recording)

04 Voice laboratory setting (source of the voice recording, phone numbers and POCs)
05 Role of voice recording (known sample, unknown single speaker, unknown multiple speakers)
06 Recorder (hardware/software)
07 Type-11 record creation date
08 Voice recording creation date
09 Total recording duration
10 Physical media object (tape, CD, phonograph record,...)
11 Container Format (wav, ogg, mp3/4)
12 Codec (PCM types)
13 Preliminary signal quality (multiple quality metrics possible)
14-20 Fields reserved for future use

III. The presence and definition of segments within the audio file follow.
21 Redaction (yes/no, by whom?)
22 Redaction diary (where and why redaction occurred)
23 Snipping (yes/no, by whom?)
24 Snipping diary (separate snips/clips/cuts are numbered and identified by relative start/end times, comments)
25 Diarization (yes/no, by whom?)
26 Segment diary (segments are numbered with relative start/end times, labels of attributes attributed to the speech and speaker of each segment, and comments.)
27-30 Reserved for future use

IV. Repeating sets of sub-fields labeled by segment numbers as designated in the diarization. (If the segment number is "0", that becomes the default for all segments not otherwise listed.)
31 Date/time of recording of segment/snip and labeled date/time of recording
32 Geolocation of data subject of this Type-11 record at start of segment/snip
33 Segment/snip quality values (possible multiple values for each segment)
34 Vocal collision indicator (two or more persons speaking at once)
35 Processing priority of the segment/snip
36 Segment content (language, prompted/read/conversation, word transcript, phonetic transcript, translations)
37 Segment/snip speaker characteristics (impairment, intelligibility, health, emotion, vocal effort, vocal style, language proficiency)
38 Segment channel (transducer, capture environment, channel type)
39-50 Fields reserved for future use

V. More global fields modeled on other record types in ANSI/NIST ITL 2011:
51 Global comments
52 – 901 Fields reserved for future use
902 Annotation information
903 Device Unique Identifier
904 Make/Model/Serial
905-992 Fields reserved for future use
993 Source Agency Name

VI. The voice recording or pointers to that recording:
994 External file reference
995 Associated context (Type 21 record)

996 Voice data file hash (Note: Data integrity on the entire file is handled with a Type-98 record)
997 Source representation (Type 20 record with original audio)
998 Field reserved for future use
999 Voice data file

Draft Record Type-11: Voice record

The Type-11 record shall be used to exchange a single voice data file or a physical medium containing a digital or analog voice recording, together with fixed and user-defined textual information fields (referred to in this standard as "metadata") pertinent for understanding and processing the voice signal.

A voice signal is defined in this standard as any audible vocalizations emanating from the human mouth with or without speech content. The Type-11 record will reference a recording of a voice signal stored as a digital voice data file within the record or external to the record. Information regarding the encoding type, the voice data file size, and other parameters or comments required to process the voice data file are given as fields within the Type-11 record. If the Type-11 record references a voice recording contained in a physical medium (i.e., an analog tape, a digital tape, a CD, a phonograph record), the label and location of that medium shall be indicated in this Type-11 record, along with the information necessary to render the stored recording as acoustic output.

A transmitted voice recording may be processed by the recipient agencies to isolate the voice signal of interest and to extract the desired feature or model information required for voice comparison, speaker detection, or speech attribution purposes.

A single ANSI/NIST transaction might contain multiple voice recordings, each as a separate Type-11 record within the transaction. Although the transaction pertains to a single person, the individual voice recordings in each of the Type-11 records required for the transaction may contain the speech of multiple speakers. For each known speaker in the recording, there should be a Type-2 record in the transaction.

If there are multiple speakers of interest in a voice recording supported by a Type-11 record, then a separate ANSI/NIST-ITL transaction may be created for each individual of interest, each transaction possibly containing the same Type-11 records. If the voice recording included in or pointed to by a Type-11 record has been extracted from a longer source recording, that source recording may be included in digital form within the transaction as a Type-20 record. Voice models or features extracted from voice data are not explicitly accommodated in this record, but may be transmitted in user-defined fields.

Type-11 Record Layout

Key for Character type: N=Numeric; A=Alphabetic; AN=Alphanumeric; B=Binary or Base64
Key for Cond. code: M=Mandatory; O=Optional; D = Dependent upon another value or condition described in the text;
M↑=Mandatory if the field/subfield is used; O↑=Optional if the field/subfield is used.

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
11.001		**RECORD HEADER**	M	encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules			encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules	1	1
11.002	**IDC**	**INFORMATION DESIGNATION CHARACTER**	M	N	1	2	0 ≤ IDC ≤ 99 integer	1	1
11.003	**AOD**	**AUDIO OBJECT DESCRIPTOR**	M	N	1	1	See Table 11-1 0 ≤ AOD ≤ 4	1	1
11.004	**VLS**	**VOICE LABORATORY SETTING**	O					0	1
	LTY	lab type	O↑	A	1	1	LTY = G, I, P, O or U	0	1
	NOO	name of original source	O↑	U	1	400	none	0	1
	POC	point of contact	O↑	U	1	200	none	0	1
	CSC	code of sending country	O↑	AN	1	3	value from *ISO-3166-1*	0	1
11.005	**ROL**	**ROLE OF VOICE RECORDING**	M	N	1	2	See Table 11-2 0 ≤ ROL ≤ 99	1	1
11.006	**REC**	**RECORDER**	M					1	1
	RTP	recorder type	O	U	1	4000	None	0	1
	MAK	recorder make	O	U	1	50	None	0	1
	MOD	recorder model	O	U	1	50	None	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
	SER	recorder serial number	O	U	1	50	None	0	1
	AQS	acquisition source	M	AN	1	2	value from Table 83 except for 1 through 6 inclusive or 11; or AQS = MS	1	1
	COM	comment	O	U	1	4000	None	0	1
11.007	**RCD**	**RECORD CREATION DATE**	M	See Section 7.7.2.4 Local date and time; encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules			See Section 7.7.2.4 Local date and time; encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules	1	1
11.008	**VRD**	**VOICE RECORDING CREATION DATE**	O	See Section 7.7.2.4 Local date and time; encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules			See Section 7.7.2.4 Local date and time; encoding specific: see Annex B: Traditional encoding or Annex C: NIEM-conformant encoding rules	0	1
11.009	**TRD**	**TOTAL RECORDING DURATION**	O					0	1
	TIM	total time	O↑	N	1	11	1 ≤ TIM ≤ 99999999999 (in microseconds) (no commas)	0	1
	CBY	compressed bytes	O↑	N	1	14	1 ≤ CBY ≤ 99999999999999 (no commas)	0	1
	SMP	total samples	O↑	N	1	11	1 ≤ SMP ≤ 99999999999 (no commas)	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
11.010	**PMO**	**PHYSICAL MEDIA OBJECT**	D					0	1
	MTP	media type	M↑	U	1	300	None	0 (0 is for O; 1 would be for M)	1
	RSP	recording speed	O↑	NS	1	9	0.9999999 < RSP < 999999999 value may include a decimal point or be an integer (no commas)	0	1
	RSU	recording speed units	D	A	1	300	None	0	1
	EQ	equalization	O↑	AN	1	100	None	0	1
	TRK	tracks	O↑	N	1	2	1 ≤ TRK ≤ 99	0	1
	SPT	speaker track	O↑	NS	1	200	values between 1 and 99 inclusive that are separated by commas	0	99
	COM	comments	O↑	U	1	4000	None	0	1
11.011	**CFT**	**CONTAINER FORMAT**	O	N	1	2	External Table	0	1
11.012	**CDC**	**CODEC**	D					0	1
	CDT	codec type	M↑	N	1	3	see external **Table of Codecs**	1	1
	SRT	sampling rate	O↑	NS	1	5	0 ≤ SRT < 100,000 expressed in kHz value may include a decimal point or be an integer 0 = variable	0	1
	BIT	bit depth	O↑	N	1	2	0 ≤ BIT ≤ 60 0 = variable	0	1
	END	endian	O↑	N	1	1	0=big; 1=little;	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
							2=native		
	PNT	fixed point	O↑	N	1	1	0=floating point 1=fixed point	0	1
	NCH	number of channels	O↑	N	1	2	1 ≤ NCH ≤ 99	0	1
	COM	Comment	D	U	1	4000	None	0	1
11.013	**PSQ**	**PRELIMINARY SIGNAL QUALITY**	O					0	1
		Subfields: Repeating sets of information items						1	9
	QVU	quality value	M↑	N	1	3	0 < QVU < 100 or QVU = 255 (quality not assessed) Integer	1	1
	QAV	algorithm vendor identification	M↑	H	4	4	0000 ≤ QAV ≤ FFFF	1	1
	QAP	algoorithm product identification	M↑	N	1	5	0 < QAP < 65534 positive integer	1	1
	COM	comments	D	U	1	300	None	0	1
11.014--11.020		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**							
11.021	**RED**	**REDACTION**	O					0	1
	RDI	redaction indicator	M↑	B	1	1	0=no 1=yes	1	1
	RDA	redaction authority	O↑	U	1	300	none	0	1
	COM	comment	O↑	U	1	4000	none	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
11.022	**RDD**	**REDACTION DIARY**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	600,000
	RID	redaction identifier	M↑	N	1	6	1 ≤ RID ≤ 600000	1	1
	RST	relative start time	M↑	N	1	11	1 < RST < 99999999998	1	1
	RET	relative end time	M↑	N	1	11	99999999999 ≥ RET > RST	1	1
	COM	comment	O↑	U	1	4000	None	0	1
11.023	**SNP**	**SNIPPING SEGMENTATION**	O					0	1
	SGI	snipping indicator	M↑	B	1	1	0=no 1=yes	1	1
	SPA	snipping authority	O↑	U	1	300	None	0	1
	COM	comment	O↑	U	1	4000	None	0	1
11.024	**SPD**	**SNIPPING DIARY**	O					0	1
		Subfields: Repeating sets of information items						1	600,000
	SPI	snip identifier	M↑	N	1	6	1 ≤ SPI ≤ 600000	1	1
	RST	relative start time	M↑	N	1	11	99999999998 ≥ RST ≥ 0	1	1
	RET	relative end time	M↑	N	1	11	99999999999 ≥ RET > RST	1	1
	COM	comment	O↑	U	1	4000	None	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
11.025	**DIA**	**DIARIZATION**	D					0	1
	DII	diarization indicator	M↑	B	1	1	0=no 1=yes	1	1
	DAU	diarization authority	O↑	U	1	300	none	0	1
	COM	comment	O↑	U	1	4000	none	0	1*Su*
11.026	**SGD**	**SEGMENT DIARY**	D					0	1
		subfields: repeating sets of information items	M↑					1	600,000
	SID	segment identifier	M↑	N	1	6	1 ≤ SID ≤600,000	1	1
	TRK	track identifier	O↑	N	1	2	1 ≤ TRK ≤ 99	0	1
	RST	relative start time	M↑	N	1	11	99999999998 ≥ RST ≥ 0	1	1
	RET	relative end time	M↑	N	1	11	99999999999 ≥ RET > RST	1	1
	COM	comment	O↑	U	1	10000	None	0	1
11.027 – 11.030		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**							
11.031	**TME**	**TIME OF SEGMENT RECORDING**	D					0	1
		Subfield: repeating sets of information items	M↑					1	600,000
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
	SID	segment identifier	M↑	N	1	5	1 ≤ SID ≤ 600,000	1	1
	DOR	date of original recording	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	1
	TDT	tagged date	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	1
	SRT	start time of segment recording	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	1
	TST	tagged start time	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	1
	END	end time of segment recording	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	1
	TET	tagged end time	O↑	encoding specific: see Annex B or Annex C			encoding specific: see Annex B or Annex C	0	0
	STM	source of time	O↑	U	1	300	None	0	1
	COM	comment	O↑	U	1	4000	None	0	1
11.032	**GEO**	**SEGMENT GEOGRAPHICAL INFORMATION** (about person of interest at start of segment)	D					0	1
		Subfields: repeating sets of information items	M↑					1	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1
	SID	segment identifiers	M↑	NS	1	36 x10^{11}	0 or a list of integers separated by commas	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
	SCT	segment cell phone tower code	O↑	U	1	100	none	0	1
	LTD	latitude degree value	D	NS	1	9	-90 ≤ LTD ≤ 90	0	1
	LTM	latitude minute value	D	NS	1	8	0 ≤ LTM < 60	0	1
	LTS	latitude second value	D	NS	1	8	0 < LTS < 60	0	1
	LGD	longitude degree value	D	NS	1	10	-180 ≤ LGD ≤ 180	0	1
	LGM	longitude minute value	D	NS	1	8	0 ≤ LGM < 60	0	1
	LGS	longitude second value	D	N	1	2	0 ≤ LGS < 60 positive integer	0	1
	ELE	elevation	O↑	NS	1	8	-422.000 < ELE < 8848.000 real number	0	1
	GDC	geodetic datum code	O↑	AN	3	6	value from Table 6	0	1
	GCM	geographic coordinate universal transverse mercator zone	D	AN	2	3	one or two integers followed by a single letter	0	1
	GCE	geographic coordinate universal transverse mercator easting	D	N	1	6	integer	0	1
	GCN	geographic coordinate universal transverse mercator northing	D	N	1	8	integer	0	1
	GRT	geographic reference text	O↑	U	1	150	none	0	1
	OSI	geographic coordinate, other system identifier (or landmark)	O↑	U	1	10	none	0	1
	OCV	geographic coordinate other system value	D	U	1	126	none	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
11.033	**SQV**	**SEGMENT QUALITY VALUES**	D					0	1
		Subfields: Repeating sets of information items	M↑					1	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1
	SID	segment identifiers	M↑	NS	1	36 x10^{11}	0 or a list of integers separated by commas	1	1
	QVU	quality value	M↑	N	1	3	0 ≤ QVU ≤ 100 or QVU = 255 (quality not assessed) Integer	1	1
	QAV	algorithm vendor identification	M ↑	H	4	4	0000 ≤ QAV ≤ FFFF	1	1
	QAP	algorithm product identification	M ↑	N	1	5	0 < QAP < 65534 positive integer	1	1
	COM	comment	D	U	1	300	None	1	1
11.034	**VCI**	**VOCAL COLLISION INDICATOR**	D					0	1
		Subfields: Repeating sets of information items						1	2
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1
	SID	segment identifiers	M↑	NS	1	36 x10^{11}	0 or a list of integers separated by commas	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
11.035	**PPY**	**PROCESSING PRIORITY**	D					0	1
		Subfields: Repeating sets of information items						1	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1
	SID	segment identifiers	M↑	N	1	36 x10^{11}	0 or a list of integers separated by commas	1	1
	PTY	priority	↑	N	1	1	$1 \leq$ PTY ≤ 9	1	1
11.036	**SCN**	**SEGMENT CONTENT**	D					0	1
		Subfields: Repeating sets of information items	M↑					0	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1= segment diary	1	1
	SID	segment identifiers	M↑	N	1	36 x10^{11}	0 or a list of integers separated by commas	0	1
	TRN	transcript	O↑	U	1	100,000	none	0	1
	TRA	transcript authority	O↑	U	1	10,000		0	1
11.037	**SCC**	**SEGMENT SPEAKER CHARACTERISTIC**	D					0	1
		Subfields: Repeating sets of information items	M↑					1	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary 1=segment diary	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
	SID	segment identifiers	M↑	NS	1	36 x10^{11}	0 or a list of integers separated by commas	0	1
	IMP	impairment	O↑	N	1	1	0 ≤ IMP ≤ 5	0	1
	LBS	language being spoken	O↑	A	3	3	Value from *ISO 639-3*	0	1
	LPF	language proficiency	O↑	N	1	1	0 ≤ LPF ≤ 9	0	1
	STY	style of speech	O↑	N	1	2	See **Table 11-3**	0	1
	INT	intelligibility	O↑	N	0	1	0 ≤ INT ≤ 9	0	1
	ITM	intimacy	O↑	N	0	1	0 ≤ ITM ≤ 5	0	1
	HST	health status	O↑	U	0	4000	None	0	1
	EM	emotional state	O↑	N	1	2	See **Table 11-4**	0	1
	VEF	vocal effort	O↑	N	1	1	0 ≤ VEF ≤ 5	0	1
	VSY	vocal style	O↑	N	1	2	See **Table 11-5**	0	1
	AWR	awareness of recording process	O↑	N	1	1	0=unknown 1=aware 2=unaware	0	1
	SCR	script	O↑	U	0	99,999	None	0	1
	COM	comment	O↑	U	1	4000	None	0	1
11.038	**SCH**	**SEGMENT CHANNEL**	D					0	1
		Subfields: Repeating sets of information items	M↑					1	TBD
	DIA	diary identifier	M↑	B	1	1	0=snip diary	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
							1=segment diary		
	SID	segment identifiers	M↑	N	1	36 x10^{11}	0 or a list of integers separated by commas	0	1
	TYP	transducer type	O↑	N	1	2	See **Table 11-6**	0	1
	TRN	transducer	O↑	N	1	1	unknown=0 carbon=1 electret=2 other=3	0	1
	ENV	capture environment	O↑	AN	1	4000	Text	0	1
	DST	distance to transducer	O↑	N	1	5	0 ≤ DST ≤ 99999 Integer	0	1
	ACS	acquisition source	O↑	N	1	2	See **Table 83**	0	1
	ALT	alteration	O↑	U	1	400	None	0	1
	COM	comment	O↑	U	1	4000	None	0	1
11.039-11.050		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**							
11.051	COM	**COMMENT**	O↑	U	1	4000	none	0	1
11.052-11.099		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**	Not to be used						
11.100-11.900	**UDF**	**USER-DEFINED FIELDS**	O	user-defined			user-defined	user-defined	
11.901		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**	Not to be used						

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn #	Max #		MIn #	Max #
11.902	**ANN**	**ANNOTATION INFORMATION**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	*
	GMT	Greenwich mean time	M↑	encoding specific: see **Annex B** or **Annex C**			encoding specific: see **Annex B** or **Annex C**	1	1
	NAV	processing algorithm name version	M↑	U	1	64	none	1	1
	OWN	algorithm owner	M↑	U	1	64	none	1	1
	PRO	process description	M↑	U	1	255	none	1	1
11.903	**DUI**	**DEVICE UNIQUE IDENTIFIER**	O	ANS	13	16	first character = M or P	0	1
11.904	**MMS**	**MAKE/MODEL/SERIAL NUMBER**	O					0	1
	MAK	make	M↑	U	1	50	none	1	1
	MOD	model	M↑	U	1	50	none	1	1
	SER	serial number	M↑	U	1	50	none	1	1
	COM	comment	O↑	U	1	*	none		
11.905-11.992		**RESERVED FOR FUTURE USE only by ANSI/NIST-ITL**	Not to be used						
11.993	**SAN**	**SOURCE AGENCY NAME**	O	U	1	125	none	0	1
11.994	**EFR**	**EXTERNAL FILE REFERENCE**	D	U	1	200	none	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
11.995	**ASC**	**ASSOCIATED CONTEXT**	O					0	1
		Subfields: Repeating sets of information items	M ↑					1	255
	CAN	associated context number	M↑	N	1	3	1 ≤ ACN ≤ 255 positive integer	1	1
	ASP	associated segment position	O↑	N	1	2	1 ≤ ASP ≤ 99 positive integer	0	1
11.996	**HAS**	**HASH**	O	H	64	64	None	0	1
11.997	**SOR**	**SOURCE REPRESENTATION**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	255
	SRN	source representation number	M↑	N	1	3	1 ≤ SRN ≤ 255 positive integer	1	1
	RSP	reference segment position	O↑	N	1	2	1 ≤ RSP ≤ 99 positive integer	0	1
11.998		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
11.999	**DATA**	**VOICE DATA**	D	B	1	22	None	0	1

1. **Field 11.001: Record header**

The content of this mandatory field is dependent upon the encoding used. See the relevant annex of this standard for details. See **Section 7.1**.

2. **Field 11.002: Information Designation Character / IDC**

This mandatory field shall contain the **IDC** assigned to this Type-11 record as listed in the information item **IDC** for this record in **Field 1.003 Transaction content / CNT.** See **Section 7.3.1.** This field will allow linking of the Type-11 records to the appropriate Type-2 records in the transaction.

3. **Field 11.003: Audio Object Descriptor/AOD**

This mandatory field shall be a numeric entry selected from the attribute code column of Table 1-1. Only one value is allowed and indicates the type of audio object containing the voice recording which is the focus of this Type-11 record. Attribute code 0 indicates that the audio object of this record is a digital voice data file in the Field 11.999. Attribute code 1 indicates that the audio object is a digital voice data file at the URL given in Field 11.994. Attribute codes 2-4 indicate that the audio object is a physical media object at a location described in Field 11.994.

Table 11-1
Audio Object Descriptor

Audio Object	Attribute Code
Internal digital voice data file	0
External digital voice data file	1
Physical Media Object containing digital data	2
Physical Media Object containing analog signals	3
Physical Media Object containing unknown data or signals	4

4. **Field 11.004: Voice Laboratory Setting/VLS**

This is an optional field and shall contain information about the site or agency that created the voice recording pointed to or included in this record. In the case of files created from previous recordings, the VLS is not necessarily the source of the original transduction of the acoustic vocalizations from the person to whom the Type-11record pertains. The VLS need not be the same as the Submitting Agency of Field 1.008, any agency mentioned in the corresponding type-2 record or the Source Agency Name of Field 11.993.

- The first information item is the **lab type / LTY** is optional. There may be no more than one occurrence of this item. When present, this information item contains a single character describing the site or agency that created the voice recording:

  G = Government
  I = Commercial
  P = Private individual
  O = Other
  U = Unknown

- The second information item (**name of original source/ NOO**) is optional and shall be the name of the group, organization or agency that created the voice recording. There may be no more than one occurrence for this item. This is an optional information item is in Unicode characters and is limited to 400 characters in length.

- The third information item is the **point of contact / POC** who composed the voice recording. This is an optional information item that could include the name, telephone number and e-mail address of the person or persons responsible for the creation of the voice recording. This information item may be up to 200 Unicode characters.

- The fourth information item is optional. It is the *ISO-3166-1* **code of the sending country / CSC**. This is the code of where the voice recording was created – not necessarily the nation of the agency entered in **Field 11.993: Source agency / SRC** . All three formats specified in *ISO-3166-1* are allowed (Alpha2, Alpha3 and Numeric). A country code is either 2 or 3 characters long.

5. Field 11.005: Role of Voice Recording/ROL

This is a mandatory field and shall be a numeric entry selected from the "attribute code" column of **Table 11-2**. Only one value is allowed and indicates the role of the voice recording (known or questioned) within the transaction.

Table 11-2
Role of the Voice Recording

Role	Attribute Code
No information	0
Known sample, single speaker, subject of transaction	1
Known sample, single speaker, interlocutor	2
Known sample, single speaker, other	3
Known sample, multiple speakers, including subject of transaction	4
Known sample, multiple speakers, excluding subject of transaction	5
Questioned sample, single speaker	6
Questioned sample, multiple speakers	7
Audio recording with unknown voice content	8
Other	9
User-defined	10-99

6. **Field 11.006: Recorder / REC**

This field is mandatory and shall indicate information about the recording equipment that created the voice recording contained in or pointed to by this record. There may be no more than one occurrence of this field.

NOTE: As recordings or data files may be transcoded from previously recorded or broadcast content, this equipment may or may not be the equipment used to record the original acoustic vocalization of the person to whom Type-11 record pertains.

- The first information item (**recorder type/RTP)** is an optional text field of up to 4000 characters describing the recording equipment that created the voice recording. An example would be "Home telephone answering device".

- The second, third and fourth information items (**recorder make/MAK, recorder model/MOD, recorder serialnumber/SER)** are optional items of up to 50 characters each and shall contain the make, model and serial number, respectively, for the recording device. There may be no more than one entry for this item. See Section 7.7.1.2 for details.

- The fifth information item (**acquisition source/AQS**) is mandatory and is an alpha-numeric item. If all of the audio signal in the voice recording comes from a single acquisition source, the item shall be a numeric entry selected from the "attribute code" column of **Table 83** of the Type-20 record. When multiple sources are used for various voice segments in the voice recording, the code "MS" shall be used and individual sources will be given in the following comment item. If "12" from **Table 83** is chosen indicating an analog recording, then **Field 11.003** will indicate "3", the recording will be described in **Field 11.010**, and the location of the physical medium will be recorded in **Field 11.994**. Note that codes 1 through 6 and 11 from Table 83 are inapplicable, and shall not be used as a value in this information item.

- The sixth information item (**comments/COM**) is an optional text string of a maximum length of 4000 characters that may contain any additional information about the recorder used to create the voice recording, including information about the recording software. If AQS indicates multiple sources, "MS", this field should be used to summarize the known sources from which the voice recording was created.

Table 83
This table is copied from the Type-20 record, but is included here for convenience. Additional entries will be needed to support a voice recording record type
Acquisition Source

Acquisition source type	Attribute code
Unspecified or unknown	0
Static digital image from an unknown source	1
Static digital image from a digital still-image camera	2
Static digital image from a scanner	3
Single video frame from an unknown source	4
Single video frame from an analog video camera	5
Single video frame from a digital video camera	6
Video sequence from an unknown source	7
Video sequence from an analog video camera, stored in analog format	8
Video sequence from an analog video camera, stored in digital format	9
Video sequence frame from a digital video camera	10
Computer screen image capture	11
Analog audio recording device; stored in analog form (such as a phonograph record)	12
Analog audio recording device; converted to digital	13
Digital audio recording device	14
Landline telephone – both sender and receiver	15
Mobile telephone – both sender and receiver	16
Satellite telephone – both sender and receiver	17
Telephone – unknown or mixed sources	18
Television – NSTC	19
Television – PAL	20
Television – Other	21
Voice-over-internet protocol (VOIP)	22
Radio transmission: short-wave (specify single side band or continuous wave in FDN)	23
Radio transmission: amateur radio (specify lower side band or continuous wave in FDN)	24
Radio transmission: FM (87.5 MHz to 108 MHz)	25
Radio transmission: long-wave (150 kHz to 519 kHz)	26
Radio transmission: AM (570 kHz to 1720 kHz)	27
Radio transmission: Aircraft frequencies	28
Radio transmission: Ship and coastal station frequencies	29
Vendor specific capture format	30
Other	31

7. Field 11.007: Record Creation Date/RCD

This mandatory field shall contain the date and time of creation of this Type-11 record. This date will generally be different from the voice recording creation date and may be different from the date at which the acoustic vocalization originally occurred. See **Section 7.7.2.4 Local date and time** for details.

8. Field 11.008: Voice Recording Creation Date/VRD

This optional field shall contain the date and time of creation of the voice recording contained in the record. If pre-recorded or transcoded materials were used, this date may be different from the date at which the acoustic vocalization originally occurred. See **Section 7.7.2.4 Local date and time** for details.

9. Field 11.009: Total Recording Duration / TRD

This field is optional and gives the total length of the voice recording in time, compressed bytes and total samples. At least one of the three information items must be entered if this field is used.

- The first information item (**time/TIM**) is optional and gives the total time of the voice recording in microseconds. The size of this item is limited to 11 digits, limiting the total time duration of the signal to 99,999 seconds, which is approximately 27 hours.

- The second information item (**compressed bytes/CBY**) is optional and gives the total number of compressed bytes in the voice data file. Consequently, this information item applies only to digital voice recordings stored as voice data files. The size of this item is limited to 14 digits, limiting the total size of the voice data file to 99 terabytes.

- The third information item (**total samples/TSM**) is optional and gives the total number of samples in the voice data file after any decompression of the compressed signal. This information item applies only to digital voice recordings stored as voice data files. The size of this item is limited to 11 digits, limiting the total number of samples to 99 $x10^9$ samples.

10. Field 11.010: Physical Media Object/ PMO

This field is optional and identifies the characteristics of the physical media containing the voice recording. There can be only one physical media object per Type-11 record, but multiple Type-11 records can point to the same physical media object. This field only applies if Field 11.003 has an attribute code of 2,3 or 4. The location of the physical media object is given in Field 11.994.

- The first information item (**media type/MTP**) is mandatory if this field is used and contains text of up to 300 characters describing the general type of media (i.e., analog cassette tape, reel-to-reel tape, CD, DVD, phonograph record) upon which the voice recording is stored. If an analog media is used for storage, and AQS of Field 11.006 is 14,

then a description of the digital to analog procedure should be noted in **Field 11.902** and the reasons for such a conversion noted in COM of Field 11.010.

- The second information item (r**ecording speed/RSP**) is optional and gives a numerical value to the speed at which the physical media object must be played to reproduce the voice signal content. This value may be integer or floating point and shall not exceed 9 characters.

- The third information item (r**ecording speed units/RSU**) is mandatory if the second information item, RSP, is entered and contains text of up to 300 characters to indicate the units of measure to which the second information item (RSP) refers.

- The fourth information item (e**qualization/EQ**) is optional and indicates the equalization that should be applied for faithful rendering of the voice recording on the physical media object.

- The fifth information item (t**racks/TRK**) is an optional integer between 1 and 99, inclusive, that gives the number of tracks on the physical media object. For example, a stereo phonograph record will have 2 tracks.

- The sixth information item (s**peaker track/STK**) is an optional list of integers which indicate which tracks carry the voices of the speaker(s). Note that the speaker(s) may be identified by a Type-2 record linked to this Type-11 record by having the same IDC.

- The seventh information item (c**omment/COM**) is optional and allows for additional comments of up to 4000 Unicode characters in length describing the physical media object.

11. Field 11.011: Container Format/CFT

This is an optional field (**container format/CFT**) that gives information about the container format, if any, which encapsulates the audio data of the electronic file used to carry the voice data in the digital recording. This field is not used if the voice recording is stored on a physical media object as an analog signal. If present, this field overrides the CDC Field 11.012. This field does not accommodate multiple Container Formats in a single Type-11 record. The Container Format shall be entered as the appropriate integer code from the Table below.

Typically these are files with headers describing the data and its encoding. Container files contain the audio samples and the audio specifications to properly decode the audio (or video), such as the codec; codec parameters; number of channels; sample rate; bit/byte depth; big, little, or native endian (which byte goes first) that are typically stored in the form of a header. More generally, the container formats may specify a codec or may encapsulate one or more audio channels as Linear PCM. In one case, Apple uses a pseudo-codec to indicate the endian sense.

A popular container format today is Microsoft's Waveform Audio File Format (WAVE or WAV), which is a Microsoft Resource Interchange File Format (RIFF) method for storing data

in chunks and is given the Windows filename extension *.wav*. The well-known Wave container specification has fields such as chunk ID, chunk size, audio format (codec), sampling rate, number of channels, space for extra parameters (for the codec or other uses). The Audio Format field within Wave can be harmonized with the Type-11 codec nomenclature defined below. Below is a list of canonical container formats, and other widely recognized container formats to be transcoded to canonical containers before inclusion in a Type-11 Record. Type-11 supports the following Container Formats. These are the most common container formats in the law-enforcement community. Rare container formats can be handled via conversion to a supported format, such as RIFF (.wav) outside the Type-11. For example, free software utilities such as MPlayer, SoX, or SUPER© can be used to convert to common audio formats.

External Table of Audio Visual Container Types

Container Type	Extension	Attribute Code
WAV (RIFF audio)*	.wav	1
AVI (RIFF video)		2
WebM (Vorbis)*		3
WebM (VP8 video)		4
AIFF*	.aiff .aif	5
Vorbis (OGG audio)*	.ogg	6
Theora (OGG video)		7
MPEG program stream (PS)		8
MPEG2 transport stream (TS)		9
MP4 (H.264/MPEG-4 AVC)		10
MKV Matroska container	.mkv	11
MXF Material eXchange Format (SMPTE std.)		12
ISO base media file format (3GP, MP4, ISO IEC)		13
ASF (MS container for wma, and wmv)		14
DVR-MS (MS container based upon ASF)		15
RMVB RealNetworks		16
RM (Realmedia)		17
QuickTime (Apple VBR-audio/video/image)	.mov .qt	18
FLV (Flash video)	.flv	19
F4V (Flash video)		20
Video for Windows	.avi	21
Windows Media	.wmv .wma .asf .asx	22
MPEG-1	.mpg .mpeg .mpe	23
MPEG-2	.vob	24
MPEG-3	.mp3	25
MPEG-4	.mp4	26
3GP and 3G2 mobile video	.3gp .3g2	27

* Canonical Container File Format

Container formats evolve and new formats will be considered in this Type-11 record. Hazardous container formats, such as Flash Video (.flv) that encapsulates scripting language or code, are risky and should be avoided. Recommendation: reformat hazardous container formats to a canonical container format, such as RIFF, for transmission via a Type-11.

Raw, or headerless, files have only the audio samples and a file name to go on, in the absence of other information. All the audio characteristics required to properly interpret those samples must be gleaned elsewhere, hence, the need for the table of codecs, SRT, BIT, NCH, COM (Field 11.011), etc.

12. Field 11.012: Codec/CDC

This is an optional field that gives information about the Codec used to encode the voice data in the digital recording. This field is not used if the voice recording is stored on a physical media object as an analog signal. This field is only used if no header is read for the digital audio file when it is opened. Information in Field 11.011 (**Container Type/CFT**) overrides this Field if both are present.

- The first information item (**codec type/CDT)** is mandatory if this information item is used and indicates the single Codec type used for all audio segments in the record. This format does not accommodate multiple Codec types within a single record. It shall be a numeric entry selected from the "attribute code" column of the **Table of Codecs** that is available at http://www.nist.gov/itl/iad/ig/ansi_standard.cfm. These Codecs can be compressed (such as MP3) or uncompressed (such as linear pulse code modulation) file formats and are generally not open source, unlike OGG. For example, WAV and AIF containers and MP3 codec specifications are owned by Microsoft, Apple, and the Fraunhofer Institute, respectively. OGG is a free, open container format maintained by the Xiph.Org Foundation. If the codec type is identified as "other" -- a value of 4, the fifth information item (**comment/COM**) shall be used to describe the codec.

Table of Codecs

Codec Type	Attribute Code
Linear PCM	1
Floating-point linear PCM	2
ITU-T G.711 (PCM): μ -law or A-law with reverse sample option	3
Other	4

- The second item (**sampling rate/SRT**) indicates the number of digital samples that represent a second of analog voice data upon conversion to an acoustic signal. The sampling rate is expressed in kHz and may contain a decimal point or may be an integer. Acceptable values are between 0 and 100 MHz (100,000 kHz), but unknown sampling rates shall be given the value of 0. Common values of SRT are 8000, 11025, 16000,

22050, 32000, 44100, and 48000 Hz. Each audio segment in the record is presumed to have the same sampling rate.

- The third item (**bit depth/BIT**) indicates the number of bits that are used to represent a single sample of voice data. Acceptable values are between 1 and 60, inclusive. Encoders of unknown or variable bit depth shall be given the value of 0. Nothing in this field is meant to be an indication of the dynamic range of the voice data. Changes to bit depth should be logged in Type-98 or **Field 11.902** audit logs. Common values for BIT are 8, 16, 24, and 32 bits.

- The fourth item (**endian/EDN**) is optional and indicates which byte goes first. The values for EDN are 0=big, 1=little, or 2=native endian.

- The fifth item (**fixed point/PNT**) is optional and indicates the sample representation. The value is 0 if the samples are represented as floating-point and 1f the samples are fixed-point.

- The sixth item (**number of channels/NCH**) is optional and gives the integer number of channels of data represented in the digital voice data file. The number of channels must be between 1 and 99, inclusive. If this item is not included, the voice data file will be assumed to have only one channel. Common values for NCH are 1 and 2 channels.

- The seventh item (**comment/COM**) is an optional unrestricted text string of up to 4000 characters in length that may contain additional information about the codec or additional instructions for reconstruction of audio output from the stored digital data. However, this information item shall be present if CDT = 4 (Other). This item would include description of any noise reduction processing or equalization that must be applied to faithfully render the voice recording. Codec parameters shall be specified in this field when required for unambiguous decoding.

13. Field 11.013: Preliminary Signal Quality/PSQ

This field is optional and gives an assessment of the general "quality" of the voice recording. There may be as many as 9 PSQ subfields for the audio file to indicate different types of quality assessments.

- The first information item (**quality value/QVU**) is mandatory if this field is used and shall indicate the general quality value between 0 (low quality) and 100 (high quality). A value of 255 indicates that quality was not assessed.

- A second information item is mandatory if this field is used and shall specify the ID of the vendor of the quality assessment algorithm used to calculate the quality score, which is an **algorithm vendor identification / QAV**. This 4-digit hex value (See **Section 5.5 Character types)** is assigned by IBIA and expressed as four characters. The IBIA maintains the Vendor Registry of CBEFF Biometric Organizations that map the value in

this field to a registered organization. For algorithms not registered with the IBIA, the value of 0x00 shall be used.

- A third information item is mandatory if this field is used and shall specify a numeric product code assigned by the vendor of the quality assessment algorithm, which may be registered with the IBIA, but registration is not required. This is the **algorithm product identification / QAP** that indicates which of the vendor's algorithms was used in the calculation of the quality score. This information item contains the integer product code and should be within the range 1 to 65,534. For products not registered with the IBIA, the code 0 shall be used.

- The fourth information item (**comment/COM**) is optional and should be used to give additional information about the quality assessment process. It shall be used to describe unregistered algorithms.

14. Fields 11.014-020: Reserved Fields

These fields are reserved for future use by ANSI/NIST-ITL.

15. Field 11.021: Redaction/ RED

This field is optional and indicates whether the voice recording has been redacted, meaning that some of the audio record has been overwritten ("Beeped") or erased to delete speech content without altering the relative timings within, or the length of, the segments. This field is not to be used to indicate that audio content has been snipped with the alteration of the relative timings in or length of the segment.

- The first information item (**redaction indicator/RDI)** is a binary variable and is mandatory if this field is used. It indicates whether the voice recording contains overwritten or erased sections intended to remove, without altering the length of the segment, semantic content deemed not suitable for transmission or storage. 0 indicates no redaction and 1 indicates that redaction has occurred.

- The second information item (**redaction authority/RDA)** is an optional text field of up to 300 characters in length containing information about the agency that directed, authorized or performed the redaction. Agencies undertaking redaction activities on the original speech should log their actions by appending to this item and noting the change of field contents in the Type-98 record and / or **Field 11.902** of this record

- The third information item (**comment/COM)** is an optional unrestricted text string of up to 4000 characters in length that may contain text information about the redactions affecting the stored voice data.

16. Field 11.022: Redaction Diary/RDD

This optional field (**redaction diary/RDD**) indicates the timings with the voice recording of redacted (overwritten) audio segments. The redactions need not be dominated by speech from the subject of this transaction or record.. Three items (uniquely numbering the redactions and giving relative start and end times of each) are mandatory if this field is used and shall repeat for each redaction. A fourth item is optional and accommodates comments on the individual redactions. The record type accommodates up to 600,000 redactions by repeating the subfield.

- The first item (**redaction identifier/RID**) is mandatory if this field is used and uniquely numbers the redactions to which the following items in the field apply. There is no requirement that the redactions be numbered sequentially. The **RID** may contain up to 3 digits, meaning that the number of redactions that may be identified is limited to 600,000.

- The second item (**relative start time/RST**) is a mandatory integer for every redaction identified by an **RID** and indicates in microseconds the time of the start of the redaction relative to the beginning of the voice recording. The item can contain up to 11 digits, meaning that the start of a redaction might occur anywhere within a voice recording limited to about 27 hours. It is not expected that redactions will overlap, meaning that the RST of a redaction is not expected to occur between the **RST** and **RET** of any other redaction, although this is not prohibited. If the Type-11 record refers to an analog recording, the method of determining the start time shall be given in the comment item of this field.

- The third item **(relative end time/RET**) is a mandatory integer for every redaction identified by an **RID** and indicates in microseconds the time of the end of the redaction relative to the beginning of the voice recording. The item can contain up to 11 digits, meaning that the end of a redaction might occur anywhere within a voice recording limited to about 27 hours As with the **RST**, it is not expected that redactions will overlap, although this is not prohibited.

- The fourth item (**comment/COM**) is an optional unrestricted text string of up to 4000 characters in length that allows for comments of any type to be made on a redaction.

17. Field 11.023: Snipping Segmentation/ SNP

This field is optional and indicates whether the voice recording referenced in this Type-11 record has had segments removed or contains segments that have been snipped from one or more longer voice recordings, in either case meaning that the voice signal is not a continuous recording in time. This field is used to indicate removal, for any reason, of audio signal from the original recording of the acoustic vocalizations in a way that disrupts time references.

- The first information item **(snip indicator/SGI)** is a binary variable and is mandatory if this field is used. It indicates whether the voice recording contains temporal

discontinuities caused by snipping of segments from one or more longer recordings. 0 indicates no snipping and 1 indicates that snipping has occurred.

- The second information item (**snipping authority/SPA)** is an optional text field of up to 300 characters containing information about the agency that performed the snipping segmentation. Agencies undertaking snipping activities on the original speech should log their actions by appending to this item and noting the change of field contents in the Type-98 record and / or **Field 11.902** of this record.

- The third information item (**comment/COM)** is an optional unrestricted text string of up to 4000 characters that may contain text information about the snip activities affecting the voice recording.

18. Field 11.024: Snipping Diary/SPD

This optional field (**snipping diary/SPD**) allows this type to document the snips obtained from larger voice recordings, which might themselves be included in the transaction as Type-20 records. There may be up to 600,000 snips diarized in repeating subfields. Each snip shall be dominated by speech from the subject of this Type-11 record, who may be described in a Type-2 record within the transaction with the same IDC as this Type-11 record. Three items (uniquely numbering the snips and giving relative start and end times of each) are mandatory in each subfield. A fourth item is optional within each subfield and allows for comments on the identified snip. If there is no snipping (**Field 11.023**) indicated, then all of the data in the voice recording will be considered as in a single snip and the subfields will not repeat. There can be at most one snipping diary for each Type-11 record.

- The first item (**snip identifier/SPI**) is mandatory in each subfield and uniquely numbers the snip to which the following items in the subfield apply. There is no requirement that the snips be numbered sequentially. The **SPI** may contain up to 6 digits and up to 600,000 snips may be identified. If **Field 11.023** indicates snipping, the voice recording must consist of at least one snip.

- The second item (**relative start time/RST**) is a mandatory integer for every snip identified by an **SPI** and indicates in microseconds the time of the start of the snip relative to the beginning of the voice recording. The item can contain up to 11 digits, meaning that the **RST** might occur anywhere within a voice recording limited to about 27 hours. Because each snip is obtained independently from a larger voice recording, snips shall not overlap, meaning that the **RST** of a snip shall not occur between the **RST** and **RET** of any other snip. If the Type-11 record refers to an analog recording, the method of determining the start time shall be given in the comment item of this field.

- The third item **(relative end time/RET**) is a mandatory integer for every snip identified by an **SPI** and indicates in microseconds the time of the end of the snip relative to the beginning of the voice recording. The item can contain up to 11 digits, meaning that the

snip may end anywhere within the 27 hour voice recording. Because each snip is obtained independently from a larger voice recording, snips shall not overlap, meaning that the **RET** of a snip shall not occur between the **RST** and **RET** of any other snip.

- The fourth item **(comment/COM**) is an optional unrestricted text string of up to 4000 characters in length that allows for comments of any type to be made on a snip. This allows for comments on a snip-by-snip basis, including comments on the source of each snip. This comment field could contain word- or phone-level transcriptions, language translations or security classification markings, as specified in exchange agreements.

19. Field 11.025: Diarization/DIA

This field (**Diarization/DIA**) is optional and indicates whether the voice recording has been diarized, meaning that time markings are included in **Field 11.026** to indicate the speech segments of interest pertaining to the subject of this Type-11 record. Therefore, if this field is present, then **Field 11.026** shall also be present in the record.

- The first information item (**diarization indicator/DII)** is mandatory if this field is used. It is a binary variable that indicates whether the voice recording is accompanied by a segment diary in **Field 11.026** indicating speech segments from the voice signal subject of the Type-11 record. 0 indicates no accompanying diary and 1 indicates one or more accompanying diaries.

- The second information item (**diarization authority/DAU)** is an optional text field of up to 300 characters containing information about the agency that performed the diarization. Agencies undertaking diarization activities on the original speech should log their actions by appending to this item and noting the change of field contents in the Type-98 record and / or **Field 11.902** of this record.

- The third information item (**comment/COM) is an optional** unrestricted text string of up to 4000 characters that may contain text information about the diarization activities undertaken on the voice data.

20. Field 11.026: Segment Diary/SGD

This field only appears if **Field 11.025** is present and DII = 1. This field (**segment diary/SDI**) contains repeating subfields that name and locate the segments within the voice recording of this Type-11 record associated with a single speaker. Within a Type-11 record, there may be only one segment diary describing a single speaker within the single voice recording. If additional diarizations of this voice recording are necessary -- for example, to locate segments of speech from a second speaker in the voice recording, additional Type-11 records must be created. Each segment diarized shall contain speech from the subject of this record, although a segment may contain speech collisions. The subject may be described in the Type-2 record with the same IDC

value as this record. This record type accommodates up to 600,000 speech segments as repeating subfields. For voice recordings consisting of snips, the **SPD** may be included in the **SGD** as a subset and may be identical.

- The first item (**segment identifier/SID**) is mandatory in each subfield and uniquely numbers the segment to which the following items in the subfield apply. There is no requirement that the segments be numbered sequentially in sequential subfields. The **SID** may contain up to 6 digits, but the number of segments identified in the field (the total number of recurring subfields) is limited to 600,000.

- The second item (**track identifier/TRK)** is optional and indicates the track or channel of a multichannel voice recording upon which this segment is found. The number of tracks or channels on the recording is limited to 99, so this item may take any value between 1 and 99, inclusive.

- The third item (**relative start time/RST**) is a mandatory integer for every segment identified and indicates in microseconds the time of the start of the segment relative to the absolute beginning of the voice recording. The item can contain up to 11 digits, meaning that the segment can start at any time within the 27 hour voice recording. Because each segment is expected to be dominated by the primary subject of this Type-11 record, it is not expected that segments will overlap, meaning that the RST of a segment is not expected to occur earlier than the end of a previous segment, although this is not prohibited. In multiple transactions involving multiple speakers using the same voice data record, segments across the transactions may overlap during periods of voice collision. If the Type-11 record refers to an analog recording, the method of determining the start time shall be given in the comment item of this subfield.

- The fourth item **(relative end time/RET**) is mandatory for every segment and indicates in microseconds the time of the end of the segment relative to the absolute beginning of the voice recording. The item can contain up to 11 digits, meaning that the segment can end at any time within the 27 hour voice recording. As with the RST, it is expected that segments from the subject of this Type-11 record will not overlap, although this is not prohibited.

- The fifth item **(comment/COM**) is an optional unrestricted text string of a maximum of 10,000 characters in length that allows for comments of any type to be made on a segment. This comment item could contain word- or phone-level transcriptions, language translations or security classification markings, as specified in exchange agreements.

21. Field 11.027-030: Reserved Fields

These fields are reserved for future use by ANSI/NIST-ITL.

22. Field 11.031: Time of Segment Recording /TME

This optional field (**Time of Segment Recording/TME**) contains up to TBD subfields, each referring to a segment identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026** and gives the date, start, and end times of the original transduction of the contemporaneous vocalizations in the identified segment. This field is only present if **Field 11.024** or **Field 11.026** is present in this record. This field also accommodates circumstances in which the original voice recording was tagged with a time and date field. There is no requirement that the date and times for the original recording match the dates and times of the tags, if the tags have been determined to be inaccurate.

- The first item (**diary identifier/DIA**) is a mandatory in each subfield and is a binary value that indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of Field 11.026, the value is 1.

- The second item **(segment identifier/SID**) is mandatory and gives the segment identifier from the diary given in the first item above to which the values in this subfield pertain. Together, the first and second items of each subfield uniquely identify the segment to which the following items apply.

- The third item **(date of original recording/DOR**) is optional and gives the date of the original, contemporaneous capture of the voice data in the segment identified. See **Section 7.7.2.3.**

- The fourth item **(tagged date/TDT**) is optional and gives the date tagged on the original, contemporaneous capture of the voice data in the segment identified. This item may be different from the value of the **DAT** above, if the tag is determined to be inaccurate. See **Section 7.7.2.3.**

- The fifth item (**start time of segment recording/SRT**) is optional and gives the local start time of the original, contemporaneous capture of the voice data in the segment identified. See **Section 7.7.2.4 Local date and time** for details.

- The sixth item (**tagged start time/TST**) is optional and gives the time tagged on original, contemporaneous capture of the voice data at the start of the segment identified. This item may be different from the value of the **RST** above, if the tag is determined to be inaccurate See **Section 7.7.2.4 Local date and time** for details.

- The seventh item (**end time of recording/END**) is optional and gives the local end time of the original, contemporaneous capture of the voice data in the segment identified. See **Section 7.7.2.4 Local date and time** for details.

- The eight item (**tagged end time/TET**) is optional and gives the time tagged on original, contemporaneous capture of the voice data at the end of the segment identified. This item

may be different from the value of the **END** above, if the tag is determined to be inaccurate. See **Section 7.7.2.4 Local date and time** for details.

- The ninth item (**Source of the time/STM**) is an optional string of up to 300 characters that gives the reference for the values used for **TDT**, **SRT** and **END**.

- The tenth item (**comment/COM**) is an unrestricted text string of up to 4000 characters in length that allows for comments of any type to be made on the timings of the segment recording, including the perceived accuracy of the values of **TDT**, **SRT** and **END**.

23. Field 11.032: Segment Geographical Information/GEO

This field (**Segment Geographical Information/GEO**) contains up to TBD repeating subfields, each referring to a segment identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026** and giving geographical location of the primary subject of the Type-11record at the beginning of that segment.. This field is only present if **Field 11.024** or **Field 11.026** is present in this record.

- The first item (**diary identifier/DIA**) is a mandatory in each subfield and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of Field **11.026**, the value is 1.

- The second item (**segment identifier/SID**) is mandatory in each subfield and gives the segment identifiers from diary to which the values in this subfield pertain. The number of segment identifiers listed is limited to 600,000. A value of 0 in this subfield indicates the segment geographical information in this subfield shall be considered the default value for all segments not specifically identified in other occurrences of this subfield. If multiple segments are identified, they are designated as integers separated by commas.

- The third item (**segment cell phone tower code/SCT)** is optional and identifies the cell phone tower, if any,that relayed the audio data at the start of the segment or segments referred to in this subfield. It is a text field of up to 100 unrestricted characters.

- The next six items are latitude and longitude values. **See Section 7.7.3**

- The tenth information item (**elevation / ELE)** is optional. . It is expressed in meters. **See Section 7.7.3.** Permitted values are in the range of -442 to 8848 meters. For elevations outside of this range, the lowest or highest values shall be used, as appropriate.

- The eleventh information item (**geodetic datum code / GDC)** is optional. **See Section 7.7.3.**

- The twelfth, thirteenth and fourteenth information items (**GCM**/**GCE**/**GCN**) are treated as a group and are optional. These three information items together are a coordinate which

represents a location with a Universal Transverse Mercator (**UTM**) coordinate. If any of these three information items is present, all shall be present. **See Section 7.7.3**

- The fifteenth information item (**geographic reference text /GRT)** is optional. **See Section 7.7.3**

- A sixteenth information item (**geographic coordinate other system identifier / OSI)** is optional and allows for other coordinate systems and the inclusion of geographic landmarks. **See Section 7.7.3**

- A seventeenth information item (**geographic coordinate other system value / OCV)** is optional and shall only be present if **OSI** is present in the record**. See Section 7.7.3**

24. Field 11.033: Segment Quality Values/SQV

This field (**Segment Quality Values/SQV**) contains up to TBD repeating subfields, each referring to a list of segments identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026.** The items in each subfield give an assessment of the quality of the voice data within the segments identified in the subfield. This field is present only if Field 11.024 or Field 11.026 exists in the record. This contrasts with **Field 11.012** that gives the general quality across the entire audio recording. Values in this field dominate any values given in **Field 11.012**. It is possible for each segment given in the associated diary to have different quality. The subfields accommodate only a single quality value. If segments have multiple quality values based on different types of quality assessments, then multiple subfields are entered for those segments.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.026**, the value is 1.

- The second item (**segment identifiers/SID**) is a mandatory list of integers and gives the segment identifiers from diary to which the values in this subfield pertain. The number of segment identifiers listed is limited to 600,000. A value of 0 in this subfield indicates the segment quality information in this subfield shall be considered the default value for all segments not specifically identified in other subfields of this field. If multiple segments are entered, they are listed as integers separated by commas.

- The third **information item (quality value/QVU**) is mandatory and shall indicate the segment quality value between 0 (low quality) and 100 (high quality). A value of 255 indicates that quality was not assessed. An example would be the *Speech Intelligibillity Index, ANSI 3.5 1997.*

- A fourth information item is mandatory and shall specify the ID of the vendor of the quality assessment algorithm used to calculate the quality score, which is an **algorithm vendor identification / QAV**. This 4-digit hex value (See **Section 5.5 Character types)**

is assigned by IBIA and expressed as four characters. The IBIA maintains the Vendor Registry of CBEFF Biometric Organizations that map the value in this subfield to a registered organization. A value of 0000 indicates a vendor without a designation by IBIA. In such case, an entry shall be made in COM of this subfield describing the algorithm and its owner / vendor.

- A fifth information item is mandatory and shall specify a numeric product code assigned by the vendor of the quality assessment algorithm, which may be registered with the IBIA, but registration is not required. This is the **algorithm product identification / QAP** that indicates which of the vendor's algorithms was used in the calculation of the quality score. This information item contains the integer product code and should be within the range 0 to 65,534. A value of 0 indicates a vendor without a designation by IBIA. In such case, an entry shall be made in COM of this subfield describing the algorithm and its owner / vendor.

- The sixth information item (**comment/COM**) is optional but shall be used to provide information about the quality assessment process, including a description of any unregistered quality assessment algorithms used. (if QAV= 0000 or QAP = 0)

25. Field 11.034: Vocal Collision Indicator/VCI

This optional field (**Vocal Collision Indicator/VCI**) contains up to 2 subfields, each referring to a list of segments identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026** and indicating that a vocal collision (two or more persons talking at once) occurs within the segment. This field shall only appear if **Field 11.024** or **Field 11.026** exists in this record.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.0**26, the value is 1.

- The second item (**segment identifier/SID**) is a mandatory list of integers separated by commas and gives the segment identifiers from the diary named in the item above in which vocal collisions occur. There may be up to 600,000 segments identified in this subfield.

26. Field 11.035: Processing Priority /PPY

This optional field (**Processing Priority/PPY**) contains up to TBD repeating subfields, each referring to a list of segments identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026** and indicating the priority with which the segments named in those diaries should be processed. If this field exists, segments not identified should be given the lowest priority. This field is distinct from **Field 1.006**, which gives a priority for processing the entire transaction.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.026**, the value is 1.

- The second item (**segment identifier/SID**) is a mandatory list of integers, separated by commas, and gives the segment identifiers from diary named in the first item above to which the values in this subfield pertain. There may be up to 600,000 values of this field, one for each segment identified in the diaries of **Field 11.024** or **Field 11.026**. A value of 0 in this item indicates the segment content information in this field shall be considered the default value for all segments not specifically identified in other subfields of this field.

- The third information item (**processing priority/ PPY**) is optional and indicates the priority with which the segments identified in this subfield should be processed. Priority values shall be between 1 and 9 inclusive. As with **Field 1.006**, 1 will indicate the highest priority and 9 the lowest.

27. Field 11.036: Segment Content/SCN

This optional field (**Segment Content/SCN**) contains up to TBD subfields, each referring to a segment identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026.** Each subfield gives an assessment of the content of the voice data within the identified segment and includes provision for semantic transcripts, phonetic transcriptions and translations of the segment. It may only appear if Field 11.024 or Field 11.026 is present in this record.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.026**, the value is 1.

- The second item (**segment identifier/SID**) is a mandatory list of integers separated by commas and gives the segment identifiers from diary to which the values in this subfield pertain. There may be 600,000 values of this item, one for each segment identified in related diary. A value of 0 of this item indicates the segment content information in this subfield shall be considered the default value for all segments not specifically identified in other subfields of this field.

- The third information item (**transcript/TRN**) is an optional text field of up to 100,000 characters and may contain a semantic transcription, a phonetic transcription, translation, or comments on the segment.

- The fourth information item (**transcript authority/TRA**) is an optional text field of up to 10,000 characters and shall state the authority providing the transcription, translation or comments if the third information item (**TRN**) is used. If an automated process was

used to develop the transcript, information about the process (i.e., the automated algorithm used) should be included in this text

28. Field 11.037: Segment Speaker Characteristics/SCC

This optional field (**Segment Speech Characteristics/SCC**) contains up to TBD subfields, each referring to a segment identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026**. Each subfield gives an assessment of the characteristics of the voice within the segment, including intelligibility, emotional state and impairment. This field shall only appear if Field 11.024 or Field 11.026 exists in the record.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.026**, the value is 1.

- The second item (**segment identifier/SID**) is a mandatory list of integers separated by commas and gives the segment identifiers from **Field 11.024** to which the values in this subfield pertain. There may be up to 600,000 values in this item, one for each segment identified in **Field 11.026**. A value of 0 in this item indicates the segment content information in this item shall be considered the default value for all segments not specifically identified in other occurrences of this item.

- The third information item **(impairment/IMP**) is optional and shall indicate an observed level of neurological diminishment, whether from fatigue, disease, trauma, or the influence of medication/substances, across the speech segments identified. No attempt is made to differentiate the sources of impairment**.** The value shall be an integer between 0 (no noticed impairment) and 5 (significant), inclusive.

- The fourth item (**language being spoken/LBS**) is optional and gives the 3 character *ISO 639-3* code for the dominant language in the segments identified in this subfield.

- A fifth information item (**language proficiency/LPF**) is optional and rates the fluency of the language being spoken on a scale of 0 (no proficiency) to 9 (high proficiency).

- The sixth information item **(style of speech/STY**) is optional and shall be an integer as given in **Table 11-3**. There may no more than one value for each of the segments identified in this subfield and will indicate the dominant style of speech within the segments. If attribute code "10" is chosen to indicate "other", additional explanation should be included in the tenth item (**comment/COM**) below.

Table 11-3
Style of Speech

Style of Speech	Attribute Code
Unknown	0
Public speech (oratory)	1
Conversational telephone	2
Conversation face-to-face	3
Read	4
Prompted/repeated	5
Storytelling/Picture description	6
Map task and related methods	7
Interview	8
Recited/memorized	9
Other	10
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- The seventh information item (**intelligibility/INT**) is optional and shall be an integer from 0 (unintelligible) to 9 (clear and fully intelligible).

- The eighth information item (**intimacy/ITM**) is optional and indicates the degree of familiarity between the data subject and the interlocutor, with 0 indicating no familiarity and 5 indicating high familiarity/intimacy.

- The ninth information item **(health status/HST**) is optional text noting any observable health issues impacting the data subject during the speech segment, such as symptoms of the common cold (hoarse voice, pitch lowering, increased nasality) and an indicator if the data subject regularly smokes tobacco products.

- The tenth information item **(emotional state/EM**) is an optional integer giving an estimation of the emotional state of the data subject across the segments identified in this subfield. Admissible attribute values are given in **Table 11-4**. Only one value for this item is allowed across all of the segments identified in this subfield. If attribute code "8" is chosen to indicate "other", additional explanation may be included in the tenth item (**comment/COM**) below.

Table 11-4
Emotional State

Emotional State	Attribute Code
Unknown	0
Calm	1
Hurried	2
Happy/joyful	3
Angry	4
Fearful	5
Agitated /Combative	6
Defensive	7
Crying	8
Other	9
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- The eleventh information item **(vocal effort/VEF**) is an optional integer between 0 (very low vocal effort) and 5(screaming/crying) which reports perceived vocal effort across the identified segments. Only one value is allowed for this item in each subfield.

- The twelfth information item (**vocal style/VSY**) is an optional integer assessing the predominant vocal style across the identified segments. The attribute value shall be chosen from **Table 11-5**. Only one value is allowed for this item in each subfield.

Table 11-5
Vocal Style

Vocal Style	Attribute Code
Unknown	0
Spoken	1
Whispered	2
Sung	3
Chanted	4
Rapped	5
Mantra	6
Falsetto/Head voice	7
Spoken with laughter	8
Megaphone/Public Address System	9
Shouting/yelling	10
Other	11
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- The thirteenth information item (**awareness of the recording process/AWR**) is optional and indicates whether the data subject is aware that a recording is being made. 0 indicates unknown, 1 indicates aware and 2 indicates unaware.

- The fourteenth (**script/SCR**) is optional and may be used to give the script used for read, prompted or repeated speech. This item may have up to 9,999 characters.

- The fifteenth (**comment/COM**) is optional and may be used to give additional information about the quality assessment process, including a description of any unregistered quality assessment algorithms used, notes on any known external stresses applied to the data subject, such as extremely environmental conditions or heavy physical or cognitive load, and a description of how the values in the items of this subfield were assigned. This item may have up to 4,000 characters.

29. Field 11.038: Segment Channel/SCH

This field (**Segment Channel/SCH**) contains up to TBD subfields, each referring to a segment identified in either the snip diary **SPD** of **Field 11.024** or the segment diary **SGD** of **Field 11.026**. Each subfield describes the transducer and transmission channel within the identified segments. This field shall only be present if **Field 11.024** or **Field 11.026** appears in this record.

- The first item (**diary identifier/DIA**) is mandatory and indicates the diary to which this subfield refers. If this item refers to a segment in the **SPD** of **Field 11.024**, the value is 0. If this item refers to a segment in the **SGD** of **Field 11.026**, the value is 1.

- The second item (**segment identifier/SID**) is a mandatory list of integers separated by commas, and gives the segment identifiers from diary to which the values in this subfield pertain. There may be up to 600,000 values in this item. A value of 0 in this item indicates the segment content information in this subfield shall be considered the default value for all segments not specifically identified in other subfields of this field.

- The third item **(transducer type/TYP)** is an optional integer with attribute values given in **Table 11-6** It is recognized that for most of the acquisition sources in Field 11.006 REC_AQS, as specified by Table 83, the transducer type will not be known.

Table 11-6
Transducer Type

Transducer Type	Attribute Code
Unknown	0
Array	1
Multiple style microphones	2
Earbud	3
Body Wire	4
Microphone	5
Handset	6
Headset	7
Speaker phone	8
Lapel Microphone	9
Other	10
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- The fourth item (**transducer/TRN)** is an optional integer that specifies the transducer type as unknown=0, carbon=1, electret=2, or other=3. Transducer arrays using mixed transducer types shall be designated "other".

- The fifth item (**capture environment/ENV**) is an optional text field of up to 4000 characters to describe the acoustic environment of the recording. Examples of text placed in this item would be "reverberant busy restaurant", "urban street", "public park during day".

- The sixth item (**distance to transducer/DST**) is an optional integer and specifies the approximate distance in centimeters, rounded to the nearest integer number of centimeters, between the speaker in the identified segments and the transducer. A value of 0 will be used if the distance is less than one-centimeter. Some example distances: handheld = 5cm; throat mic = 0cm, mobile telephone = 15cm; Voice-over-internet-protocol (VOIP) with a computer = 80cm, unless other information is available.

- The seventh item (**acquisition source/ACS**) is an optional integer that specifies the source from which the voice in the identified segments was received. Only one value is allowed. Permissible values are given in **Table 83** of the **Type-20** record. Any conflict between this value and **Field 11.006 REC_AQS** shall be resolved by taking this item to be correct for all segments identified in the subfield, **SCH_DIA** and **SCH_SID,** of this occurrence of **Field 11.038**.

- The eighth item (**alteration/ALT**) is an optional, unrestricted string for a description of any digital masking between transducer and recording, disguisers or other attempts to change the voice quality.

- The ninth information item (**comment/COM**) is an optional, unrestricted string for additional information to identify or describe the transduction and transmission channels of the identified segments.

30. Field 11.39-050: Reserved Fields

These fields are reserved for future use by ANSI/NIST-ITL.

31. Field 11.051: Comments/COM

This field (**Comments/COM**) is an optional unrestricted text string of up to 4000 characters in length that may contain comments of any type on the **Type 11** record as a whole. Comments on individual segments shall be given in **Field 11.024, SNP_COM**, or in **Field 11.026, SGD_COM**. This field should record any intellectual property rights associated with any of the segments in the voice recording, any court orders related to the voice recording and any administrative data not included in other fields.

32. Fields 11.052-099: Reserved Fields

These fields are reserved for future use by ANSI/NIST-ITL.

33. Fields 11.100-900: User-defined fields / UDF

These fields are user-defined fields. Their size and content shall be defined by the user and be in accordance with the receiving agency

34. Field 11.901: Reserved field

This field is reserved for future use by ANSI/NIST-ITL.

35. Field 11.902: Annotation information / ANN

This is an optional field, listing the operations performed on the original source in order to prepare it for inclusion in a biometric record type. This field logs information pertaining to this Type-11 record and the voice recording pointed to or included herein. See **Section 7.4.1.** This section is not intended to contain any transcriptions or translations themselves, but may contain information about the source of such fields in the record.

36. Field 11.903: Device unique identifier/ DUI

This field will require future development.

37. Field 11.994: Make/Model/Serial number / MMS

This field will require future development.

38. Field 11.993: Source agency name / SAN

This is an optional field. It may contain up to 125 Unicode characters. This is the name of the agency referred to in **Field 11.004** using the identifier given by domain administrator.

39. Field 11.994: External file reference / EFR

This conditional field shall be used to enter the URL / URI or other unique reference to a storage location for all source representations, if the data is not contained in **Field 11.999.** If this field is used, **Field 11.999** shall not be set. However, one of the two fields shall be present in all instances of this record type. A non-URL reference might be similar to: "Case 2009:1468 AV Tape 5". It is highly recommended that the user state the format of the external file in **Field 11.051: Comment / COM .**

40. Field 11.995: Associated context / ASC

This optional field refers to one or more **Record Type-21** with the same **ACN**. See **Section 7.3.3. Record Type-21** contains audio, video and images that are NOT used to derive the biometric data in **Field 11.999: Voice Record / DATA** but that may be relevant to the collection of that data.

41. Field 11.996: Hash/ HAS

This optional field shall contain the hash value of the data in **Field 11.999: Voice Data** of this record, calculated using SHA-256. See **Section 7.5.2**. Use of the hash enables the receiver of the data to check that the data has been transmitted correctly, and may also be used for quick searches of large databases to determine if the data already exist in the database. It is not intended as an information assurance check, which is handled by **Record Type-98**

42. Field 11.997: Source representation / SOR

This optional field refers to a representation in **Record Type-20** with the same **SRN**.

43. Field 11.998: Reserved field

This field is reserved for future use by ANSI/NIST-ITL.

44. Field 11.999: Voice record / DATA

This field contains the voice data. See Section **7.2** for details.