DICOM Correction Item

Correction Number	CP-714
Log Summary: Clarify DT value representation	

Type of Modification	Name of Standard
Clarification	PS 3.3, 3.5 2007

Rationale for Correction
The specification for DT is unclear as to how many fractional digits are required or allowed, and how many digits for UTC Offset are required or allowed.
This proposal also makes several definitional clarifications to the DA and TM VR, and to the time offset attribute of the SOP Common Module.
Sections of documents affected
PS 3.5 Section 4, and Section 6.2
PS 3.3 Section C.12.1
Correction Wording:

PS 3.5 Section 4

Section 4 Symbols and abbreviations

The following symbols and abbreviations are used in this part of the Standard.

UTC   Coordinated Universal Time

PS 3.5 Section 6.2

Table 6.2-1
DICOM VALUE REPRESENTATIONS

VR Name	Definition	Character Repertoire	Length of Value
…			
DA Date	A string of characters of the format ~~yyyymmdd~~YYYYMMDD; where ~~yyyy~~YYYY shall contain year, ~~mm~~MM shall contain the month, and ~~dd~~DD shall contain the day. ~~This conforms to the ANSI HISPP MSDS Date common data type.~~ Example: "19930822" would represent August 22, 1993. Notes: 1. ~~For reasons of backward compatibility with versions of this standard prior to V3.0, it is recommended that implementations also~~ The ACR-NEMA Standard 300 (predecessor to DICOM) support~~ed~~ a string of characters of the format yyyy.mm.dd for this VR. **Use of this format is not compliant<mark>.</mark>** 2. See also DT VR in this table.	"0"-"9" of Default Character Repertoire ~~Note: For reasons specified in the previous column, implementations may wish to support the "." character as well.~~ **In the context of a Query with range matching (see PS3.4), the character "-" is allowed, and a trailing SPACE character is allowed for padding.**	8 bytes fixed ~~Note: For reasons specified in the previous columns, implementations may also wish to support a 10 byte fixed length as well.~~ **In the context of a Query with range matching (see PS3.4), the length is 18 bytes maximum.**
…			
DT Date Time	~~The Date Time common data type. Indicates a~~**A** concatenated date-time ~~ASCII character~~ string in the format: YYYYMMDDHHMMSS.FFFFFF&ZZ~~ZZ~~**XX** The components of this string, from left to right, are YYYY = Year, MM = Month, DD = Day, HH = Hour **(range "00" - "23")**, MM = Minute **(range "00" - "59")**, SS = Second **(range "00" - "60")**, **.**FFFFFF = Fractional Second **contains a fractional part of a second as small as 1 millionth of a second (range "000000" - "999999")**~~,~~**.** **&ZZXX is an optional suffix for offset from Coordinated Universal Time (UTC), where** & = "+" or "-", and ZZ~~ZZ~~ = Hours and **XX =** Minutes of offset. ~~&ZZZZ is an optional suffix for plus/minus offset from Coordinated Universal Time.~~ **A 24 hour clock is used. Midnight shall be represented by only "0000" since "2400" would violate the hour range.** **The Fractional Second component, if present, shall contain 1 to 6 digits. If**	"0"-"9", "+", "-", "." **and the SPACE character** of Default Character Repertoire	26 bytes maximum **In the context of a Query with range matching (see PS3.4), the length is 54 bytes maximum.**

	Fractional Second is unspecified the preceding "." shall not be included. The offset suffix, if present, shall contain 4 digits. The string may be padded with trailing SPACE characters. Leading and embedded spaces are not allowed. A component that is omitted from the string is termed a null component. Trailing null components of Date Time ~~are ignored~~ **indicate that the value is not precise to the precision of those components**. **The YYYY component shall not be null.** Non-trailing null components are prohibited~~, given that~~**.** ~~t~~**T**he optional suffix is not considered as a component. **A Date Time value without the optional suffix is interpreted to be in the local time zone of the application creating the Data Element, unless explicitly specified by the Timezone Offset From UTC (0008,0201).** **UTC offsets are calculated as "local time minus UTC". The offset for a Date Time value in UTC shall be +0000.** Note**s**: ~~For reasons of backward compatibility with versions of this standard prior to V3.0, many existing DICOM Data Elements use the separate DA and TM VRs. Standard and Private Data Elements defined in the future should use DT, when appropriate, to be more compliant with ANSI HISPP MSDS.~~ Notes: 1. The range of the offset is -1200 to +1400. The offset for United States Eastern Standard Time is -0500. The offset for Japan Standard Time is +0900. 2. The RFC 2822 use of -0000 as an offset to indicate local time is not allowed. 3. A Date Time value of 195308 means August 1953, not specific to particular day. A Date Time value of 19530827111300.0 means August 27, 1953, 11;13 a.m. accurate to 1/10th second. 4. The Second component may have a value of 60 only for a leap second. 5. The offset may be included regardless of null components; e.g., 2007-0500 is a legal value.		
…			
TM Time	A string of characters of the format ~~hhmmss~~**HHMMSS**~~.frac~~**FFFFFF**; where ~~hh~~**HH**	"0"-"9", "." **and the SPACE**	16 bytes maximum

	contains hours (range "00" - "23"), ~~mm~~**MM** contains minutes (range "00" - "59"), ~~ss~~**SS** contains seconds (range "00" - "~~59~~**60**"), and ~~frac~~**FFFFFF** contains a fractional part of a second as small as 1 millionth of a second (range "000000" - "999999"). A 24 hour clock is ~~assumed~~**used**. Midnight ~~can~~ **shall** be represented by only "0000" since "2400" would violate the hour range. The string may be padded with trailing spaces. Leading and embedded spaces are not allowed.	**character** of Default Character Repertoire **In the context of a Query with range matching (see PS3.4), the character "-" is allowed.**	**In the context of a Query with range matching (see PS3.4), the length is 28 bytes maximum.**
	One or more of the components ~~mm~~**MM**, ~~ss~~**SS**, or ~~frac~~**FFFFFF** may be unspecified as long as every component to the right of an unspecified component is also unspecified**, which indicates that the value is not precise to the precision of those unspecified components**.		
	The FFFFFF component, if present, shall contain 1 to 6 digits. If ~~frac~~**FFFFFF** is unspecified the preceding "." ~~may~~ **shall** not be included. ~~Frac shall be held to six decimal places or less to ensure its format conforms to the ANSI HISPP MSDS Time common data type.~~		
	Examples:		
	1. "070907.0705 " represents a time of 7 hours, 9 minutes and 7.0705 seconds.		
	2. "1010" represents a time of 10 hours, and 10 minutes.		
	3. "021 " is an invalid value.		
	Notes: 1. ~~For reasons of backward compatibility with versions of this standard prior to V3.0, it is recommended that implementations also~~ **The ACR-NEMA Standard 300 (predecessor to DICOM)** support~~ed~~ a string of characters of the format hh:mm:ss.frac for this VR. **Use of this format is not compliant.**		
	2. See also DT VR in this table.		
	3. The Second component may have a value of 60 only for a leap second.		

PS 3.3 Section C.12.1

Table C.12-1
SOP COMMON MODULE ATTRIBUTES

Attribute Name	Tag	Type	Attribute Description
…			
Timezone Offset From UTC	(0008,0201)	3	Contains the offset from UTC to the timezone for all DA and TM Attributes present in this SOP Instance**, and for all DT Attributes present in this SOP Instance that do not contain an explicitly encoded timezone**.
			Encoded as an ASCII string in the format "&ZZ~~ZZ~~**XX**". The components of this string, from left to right, are & = "+" or "-", and ZZ~~ZZ~~ = Hours and **XX =** Minutes of offset. **Leading space characters shall not be present.**
			The offset for UTC shall be +0000; -0000 shall not be used.
			Notes: 1. This encoding is the same as described in PS 3.5 for the **offset component of the** DT Value Representation.
			2. This Attribute does not apply to values with a DT Value Representation~~, which may~~ **that** contain an explicitly encoded timezone **offset**.
			3. The corrected time may cross a 24 hour boundary. For example, if Local Time = 1.00 a.m. and Offset = +0200, then UTC = 11.00 p.m. (23.00) the day before.
			4. The "+" sign may not be omitted.
			Time earlier than UTC is expressed as a negative offset.
			Note: For example:
			UTC = 5.00 a.m.
			Local Time = 3.00 a.m.
			Offset = -0200
			The local timezone offset is undefined if this Attribute is absent.