Tracking information:

IHE Domain	Patient Care Devices
Change Proposal ID:	CP-PCD-081-00
Change Proposal Status:	Ballot
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Person assigned:	John Rhoads

Change Proposal Summary information:

Clarify treatment of time in TF vol. 2	
Submitter's Name(s) and e-mail address(es):	John Rhoads
Submission Date:	2012-06-08
Integration Profile(s) affected:	General
Actor(s) affected:	General
IHE Technical Framework or Supplement modified:	IHE Patient Care Device (PCD) Technical Framework; Volume 2; Revision 1.0; August 12, 2011
Volume(s) and Section(s) affected:	Vol. 2, Section B.7.1
Rationale for Change: Some implementers found the stipulations about time representation in observation messages unclear. This CP is a response to questions.	

Apply changes to the text of Appendix B.7.1 as follows. Insertions indicated by bold type, deletions indicated by crossed out words.

B.7.1Time Stamps and Time Synchronization

Medical device data observations conveyed by the IHE PCD DEC Technical Frameworks should where feasible use 'consistent time' for MSH-7, OBR-7, OBR-8 and OBX-14, where 'consistent time' is based on a known reference time source such as NTP or similar service. Since medical devices may use local clocks that are not synchronized to 'consistent time', a standardized representation for disclosing how the device time(s) were mapped to 'consistent time' is required to provide traceability between the two.

In order to facilitate the correlation of transmitted observations, each observation should contain a time stamp from a consistent, isochronous time-base, either by default reference to [OBR-7, OBR-8) or by **an overriding value in OBX-14**. Since many medical devices have only a sense of local time, and this local time may not be equivalent to the local time of the DOR, it is a responsibility of the DOR to ensure the reported times within an Observation Result message are consistent. This means that all observation times reported SHOULD be UTC, as indicated by including a time zone offset of +0000**, but it is permissible to use local time with the required correct time zone offset included in the timestamp representation since this can readily be converted to UTC whatever the time zone of the receiving system**. ~~However, i~~In order to preserve the original time marking provided by the device, the Observation Result message

<same as the Log Summary field below>

SHALL contain a synchronization time **element such as MDC_ATTR_TIME_ABS at the Medical Device System level** which discloses ~~both~~ the device's notion of ~~time and the corresponding 'consistent time' (UTC) of the DOR~~, as described in the following table. **The DOR SHALL use this device time as the basis for correcting the timestamps from the device (for example, for OBX-14) to the DOR's 'consistent time'.**

Msg Segment	Description and comments	Status
MSH.....	**MSH-7** Date/Time of Message created/sent (DTM_{DOR})	M
PID.....		M
OBR.....	[**OBR-7**, **OBR-8**) Default time interval for child OBXs (DTM_{DOR})	M
OBX.. 0.0.0.1	MDC_TIME_SYNC_PROTOCOL (time sync protocol used by the DOR)	O
OBX.. 0.0.0.2	MDC_TIME_ACCURACY (known or estimated accuracy of DOR time)	O
OBX.. 1	**MDS for device #1**	M
OBX.. 1.0.0.1	MDC_TIME_CAP_STATE (BITS-16, using MdsTimeCapState)	O
OBX.. 1.0.0.2	MDC_TIME_SYNC_PROTOCOL (from nom-part-infrastructure)	O
OBX.. 1.0.0.3	MDC_TIME_SYNC_ACCURACY (device absolute time accuracy)	O
OBX.. 1.0.0.4	MDC_ATTR_TIME_ABS (**displayed** time) and **OBX-14** (DTM_{DOR})	C[1]
OBX.. 1.0.0.5	MDC_ATTR_TIME_REL (**relative** time) and **OBX-14** (DTM_{DOR})	C
OBX.. 1.0.0.6	MDC_ATTR_TIME_HI_RES (**hi-res rel** time) and **OBX-14** (DTM_{DOR})	C
OBX.. 1.0.0.7	OBX-14 (DTM_{DOR}, *optional*, overrides default (OBR-7, OBR-8] time interval	
OBX.. 1.0.0.7.1	OBX-14	
OBR.....	[**OBR-7**, **OBR-8**) Default time interval for child OBXs (DTM_{DOR})	M
OBX.. 2	**MDS for device #2**	M

Notes:

Status column gives Presence Qualifier, M: mandatory, O: option, C: conditional.

The dotted numbers represent the object hierarchy value of OBX-4 and are provided as example values only.

a. DTM_{DOR} is the datetime of the DOR, reported with an HL7 V2.6 'date/time' data type. A time stamp resolution of at least one second and a time zone offset are required, e.g., **YYYYMMDDHHMMSS**[.S[S[S**]]]+/-ZZZZ** (required items shown in bold font).

b. Within the time scope of each OBR and the time interval expressed in [OBR-7, OBR-8), time discontinuities in the MDC_ATTR_TIME_ABS displayed time are prohibited. Discontinuities due to daylight savings or other clock adjustments require that data on the new displayed timeline shall be sent as a separate OBR.

c. The OBR establishes the default time context for all its child OBXs, but can be overridden by a time stamp in OBX-14.

d. The time interval specified by [OBR-7, OBR-8) is a mathematically 'closed' interval for OBR-7 and 'open' for OBR-8. A datum that occurs exactly at the time specified by OBR-8 would be sent in the next time epoch. This allows subsequent OBR segments to represent a continuous sequence of time. For encoding a simple set of episodic measurement, if there is no logical "end" of the observation period, OBR-8 may be set to the message creation time to indicate the logical upper limit for the contained observations.

HL7 time stamps sent in MSH-7, OBR-7, OBR-8 and OBX-14 should in most situations be 'consistent time' based on NTP or any other reference time source that provides traceability to NTP when this is feasible. As a consequence, it is strongly encouraged that the gateway or application device (AHD) support synchronized time as an NTP or SNTP (or other time service) client so that it can (1) apply consistent time stamps to the data reported over the WAN interface and (2) provide a time synchronization service to the agents connected to it.

The MDC_ATTR_TIME_ABS (in OBX-3) observation provides traceability between the displayed time shown on the device, as a DTM datatype in OBX-5, and the corresponding gateway or AHD time reported in OBX-14. ~~Using an OBX to report this as an observation of the time correlation is much simpler than attempting to use other HL7 V2 message segments such as TQ1 or TQ2, which are intended more for scheduling and expressing periodic time points.~~

The MDC_ATTR_TIME_REL and MDC_ATTR_TIME_HI_RES (in OBX-3) observations provide traceability between the relative or hi-resolution relative values, reported as an integer value in OBX-5, and the corresponding AHD time reported in OBX-14. The units-of-measure are μs or ms, expressed as MDC units.