

## DICOM Correction Proposal

STATUS	Assigned
Date of Last Update	2016/03/26418
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Submission Date	2016/02/01

Correction Number	CP-1609
Log Summary:	RT Ion Beams Scan Spot Time Indicator
Name of Standard	PS 3.3 2016a
<p>An important feature for treatment planning systems is the ability to calculate the actual dose distribution delivered based upon the treatment delivery record. To enable calculations of dose distributions for irradiations when both the beam is moving (e.g. dynamic MLC or scanning spot) and tissues are moving, it is necessary to provide a time stamp in the treatment delivery record for each change in the delivery condition. <a href="#">For dynamic MLC this time stamp is available on the Control Point level, but for the scan spots it is not available since they are encoded in maps below the control point level.</a> This CP provides for a time stamp at each scan spot aiming position corresponding to the scan spot position map of the treatment record.</p>	
Correction Wording:	

**Commented [RBR1]:** Michael, as the original submitter, do you think having only the START of irradiation of each spot is sufficient to meet this goal?

*In PS 3.3, Section C.8.8.26 RT Ion Beams Session Record Module, add the following attributes:*

### C.8.8.26 RT Ion Beams Session Record Module

**Table C.8.8.26-1. RT Ion Beams Session Record Module Attributes**

Attribute Name	Tag	Type	Attribute Description
Treatment Session Ion Beam Sequence	(3008,0021)	1	Sequence of setup and/or treatment beams administered during treatment session.  One or more items shall be included in this sequence.

>Ion Control Point Delivery Sequence	(3008,0041)	1	<p>Sequence of beam control points for current ion treatment beam.</p> <p>One or more items shall be included in this sequence.</p> <p>The number of items shall be identical to the value of Number of Control Points (300A,0110).</p> <p>See Section C.8.8.21.1.</p>
...			
>>Treatment Control Point Date	(3008,0024)	1	Date when the delivery of radiation at this control point began. For the final control point this shall be the Date when the previous control point ended.
>>Treatment Control Point Time	(3008,0025)	1	Time when the delivery of radiation at this control point began. For the final control point this shall be the Time when the previous control point ended.
...			
>>Number of Scan Spot Positions	(300A,0392)	1C	Number of spot positions used to specify scanning pattern for current segment beginning at control point. Required if Scan Mode (300A,0308) is MODULATED or MODULATED_SPEC.
>> Scan Spot Position Map	(300A,0394)	1C	The x and y coordinates of the scan spots are defined as projected onto the machine isocentric plane in the IEC GANTRY coordinate system (mm). Required if Scan Mode (300A,0308) is MODULATED or MODULATED_SPEC. Contains 2N values where N is the Number of Scan Spot Positions (300A,0392).
>>Scan Spot Metersets Delivered	(3008,0047)	1C	<p>A data set of Metersets delivered to the scan spot positions. The order of Metersets matches the positions in Scan Spot Position Map (300A,0394).</p> <p>The sum contained in all Metersets shall match the difference of the Delivered Meterset of the current control point to the following control point.</p> <p>Required if Scan Mode (300A,0308) is MODULATED or MODULATED_SPEC.</p>

>>Scan Spot Time Offset	(yyyy,xxxx)	3	<p>A data set of time offsets (in microseconds) between the time the Control Point was started as specified by Treatment Control Point Time (3008,0025) and the start of Radiation Deliverytime at which the steering beam reaches the X,Y position for each Scan Spot. The order of values matches the order of positions in Scan Spot Position Map (300A,0394). Contains N values where N is the Number of Scan Spot Positions (300A,0392).</p> <p>See Note 1.</p>
>>Scanning Spot Size	(300A,0398)	3	<p>The Scanning Spot Size as calculated using the Full Width Half Maximum (FWHM). Specified by a numeric pair - the size measured in air at isocenter in IEC GANTRY X direction followed by the size in the IEC GANTRY Y direction (mm).</p>
>>Number of Paintings	(300A,039A)	1C	<p>The intended number of times the scan pattern given by Scan Spot Position Map (300A,0394) and Scan Spot Meterset Weights (300A,0396) in the Referenced RT Plan was to be applied at the current control point.</p> <p>Required if Scan Mode (300A,0308) is MODULATED or MODULATED_SPEC.</p>

Commented [MFM2]: including tuning spot

Commented [RBR3]: Ion Subgroup discussed whether start AND stop times for each spot should be recorded. Determined that start time only was sufficient for the only use case mentioned in the CP header. That would work for all the MODULATED\_SPEC types currently defined.

**Note 1: The values of the Scan Spot Time Offset will be guaranteed to be in a monotonically increasing order only if the recorded Spot Position Map is in the actual delivered order.**

Recording an extra-tuning spot is considered reordering, even if the spots were delivered in the prescribed order. If re-painted spots (i.e. Number of Paintings (300A,039A) > 1) are recorded separately, then this is also considered reordering.

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In PS 3.6, Section 6, add the following new attribute:

(yyyy,xxxx)    Scan Spot Time Offset    ScanSpotTimeOffset    ULs    1-n

Commented [RBR4]: Changed in order to accommodate microseconds.