Lights in S-101

Submitted to DCEG sub group meeting 3 by the UK

This paper presents the latest S-101 lights model based on submissions to and discussion by the DCEG sub group and TSMAD. The group is invited to further discuss and endorse the model. This paper reflects new attributes which were developed as part of the CSP review work through DIPWG for lights which is attached as Annexe A of this document for information.

The model contains the following new attributes which are also being submitted to TSMAD24 in paper 4.6.1;

Sector extension

This new simple attribute is an integer carrying the distance that sectors are extended in mm's when this is not the default distance. This reflects logic currently in S-52 and values would be generated in production software. User override of the values for cartographic reasons might be considered.

Light description

This new simple attribute contains a text string which is the light description as currently created within S-52. This would be created in production software for S-101 and provided in the data. A question remains whether light descriptions should be shown for sectored lights as they are not in S-52. However given the new model it may be possible to derive the appropriate strings programmatically to address this in S-101. However user input should be sought.

Flare rotation

Flare rotation is an integer value which carries the rotation of the flare when not the default. This value is currently determined in S-52 when lights are coincident. It would be calculated in production software.

One consideration for these attributes is whether Flare rotation and Sector extension should display in pick reports it is suggested that DIPWG should ensure they do not.

The UK considers that the group should review the following element s of the lights model.

Mulit-sectored lights

Originally the lights model was as follows;

All round light – all lights without sectors

Sectored light – Lights with one or more sectors

It was amended to;

All round single sectored– all round or lights with one sector

Multi-sectored light – Lights with two or more sectors

The UK is unclear as to the reason for this change as the original approach seems simpler and more logical. The group is invited to clarify this decision or reconsider it as appropriate.

Complex for Sector

Following a proposal at TSMAD 24 a complex attribute to group sector limit values has been incorporated in the model. This avoids the need for a conditional mandatory and will make encoding simpler. The group should consider the inclusion of this attribute as included in the model.

The DCEG sub group is invited to

- Consider the proposed new attributes
- Review the questions posed
- Endorse the resultant lights model for inclusion in the DCEG draft

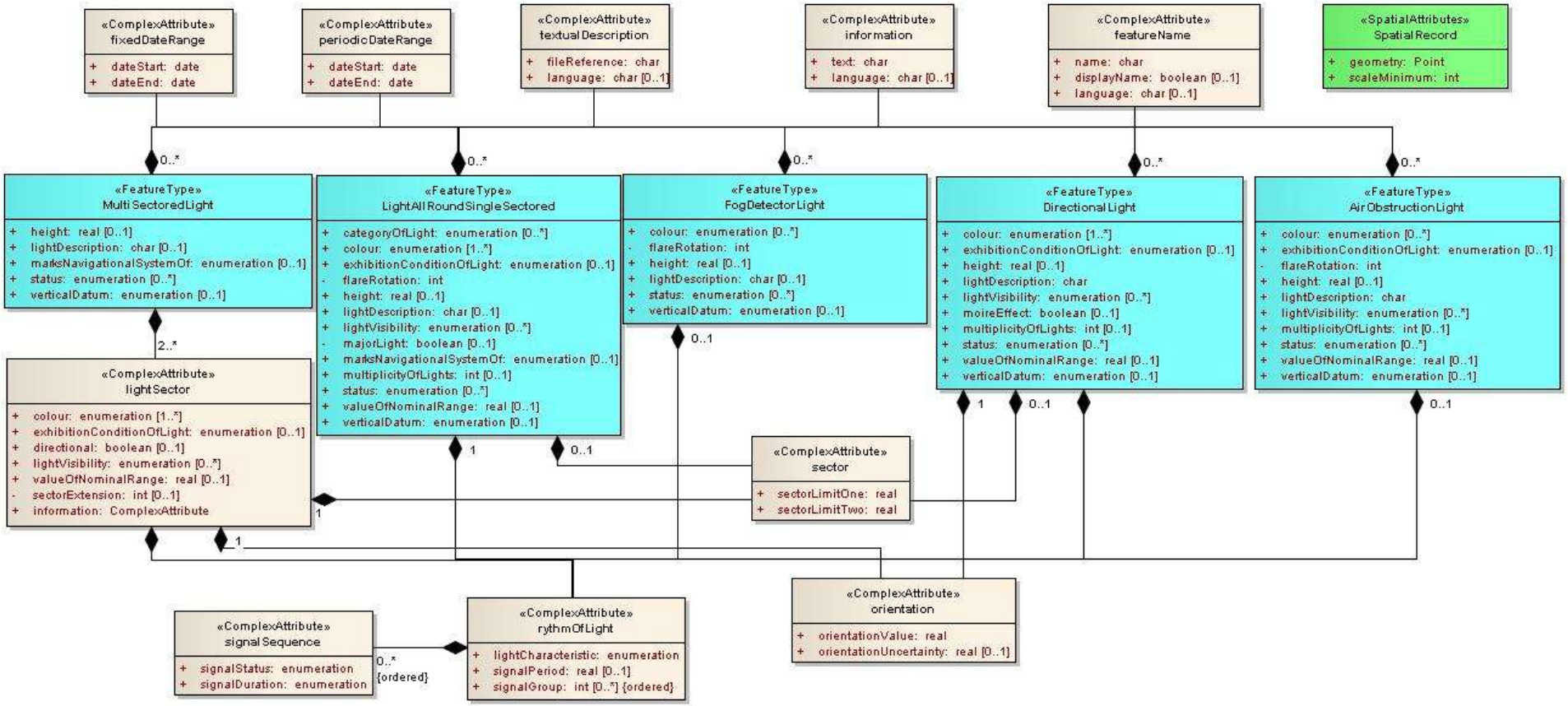


Figure 1 – The current S-101 lights data model

Annexe A

CSP Review 12.2.7 and 12.2.8

Tom Richardson 20/06/2012

This CSP review covers the following procedures;

12.2.7 LIGHTS05
12.2.8 LITDSN01

1.0 New items

The following items could be added to S-101 to reduce the complexity of Conditional Symbology Procedures. The new items include features, attributes and symbol instructions. This work follows on from that of the S-101 DCEG review group.

1.1 New Features

The Lights object in S-57 has been broken into 5 separate lights features for S-101. This work has been progressed by the DCEG sub group in order to simplify encoding and remove conditional mandatory rules. This should also simplify portrayal rules. Full details are provided in an extract from the draft DCEG document included as annexe A of this document.

1.1.1 Multisectored Light

1.1.2 All round single sectored light

Portrayal would be further simplified if a single sectored light was catered for using the sectored light feature. Can the DCEG sub group explain why the all round light should cater for single sectored lights also?

1.1.3 Directional Light – To cover directional and Moiré effect

1.1.4 Fog Light

1.1.5 Air Obstruction Light

1.2 New Attributes

Some new attributes have already been identified as part of the DCEG work this document also proposes additional new attributes. As a result of this approach additional S-58 validation checks would be require to ensure the values of the ‘portrayal attributes’ are as expected.

1.2.1 flareAngle

Flare angle is an integer value carrying the rotation of the light flare. This is populated in the data to remove the need for conditional symbology procedures. These currently identify whether non-sectored lights are coincident and adjust the flare angle accordingly.

1.2.2 lightDescription

Light description is a text attribute pre-populated in production software which avoids the need for the conditional symbology procedure LITDSN01.

1.2.3 majorLight

Major light is a Boolean attribute indicating lights which are significant in the context of the chart. Producers would populate this value as required. It would be used to display major lights with an all round sector to emphasise them in the ECDIS display.

Consideration could be given to making this a user defined option e.g. show major lights with all round sectors.

1.2.4 sectorExtension

To avoid the need for conditional symbology, the integer attribute sector extension provides the extension of a sector within the ENC data. Production software can calculate and populate the value based on the logic as currently defined in the CSP. The value is in display units (mm).

1.3 New Symbol Instructions

Due to the complexity of some elements of the Lights CSPs it is considered necessary to create new Symbol Instructions which can be included within machine readable portrayal rules. This document uses and builds on the S-52 look up table approach on the assumption that such an approach can be converted to machine readable XML. Within this document S-101 camelCase codes are used to avoid confusion.

1.3.1 Draw Sector

S-52 currently uses Conditional Symbology Procedures to draw light sectors. However to make the rules machine readable in S-101 a function needs to be defined. This will enable a rule to draw a sector arc based on a defined set of input values. The following symbol instruction is proposed to support this:

--->|DS( ) ->|	--------> |SECTR1 |	->(,)->	-------> |SECTR2|	->(,)->	|LENGTH|	->(,)->
|COLOUR |	- ( )) -->					

SECTR1 "sectorLimitOne" parameter.

The start bearing of the Arc + 180. The bearing from the origin of the arc is SECTR1-180.

SECTR2 "sectorLimitTwo" parameter.The end bearing of the Arc + 180. The bearing from the origin of the arc is SECTR2-180.

LENGTH "length" parameter defaults to 20mm. Length is the radius of the arc in the display in mm.

COLOUR "colour" parameter passed from ENC data.

Both SECTR1 and SECTR2 are optional when not included an all round circle is to be drawn.

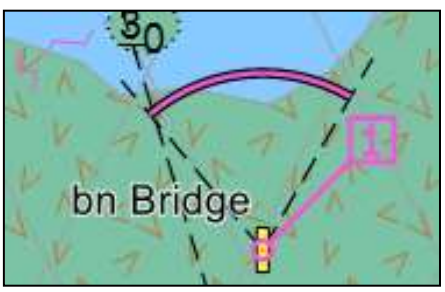
Example :

Input values

sectorLimitOne = 140
sectorLimitTwo = 210
colour = 5 (Blue)

DS(sectorLimitOne,sectorLimitTwo,sectorExtension,colour)

The instruction above draws an arc with radius 20mm between 320 and 30 degrees. The band of the arc is filled with magenta fill. As shown in the image below.



1.3.2 Draw Line

To display directional lights it is necessary to draw a line of a fixed length on a given bearing. The following symbol instruction is proposed to support this within a machine readable portrayal catalogue.

-->|DL( ) ->	|SLINE|	->(,)->	|ORIENT|	->(,)->	|LENGTH|	- ( )) --->

SLINE Symbol instruction 'show simple line style'.

ORIENT "orientation" parameter. ORIENT minus 180 is the bearing of the line from its origin.

LENGTH "length" parameter defaults to 100mm. When values are passed from ENC data they must be converted to display units (mm).

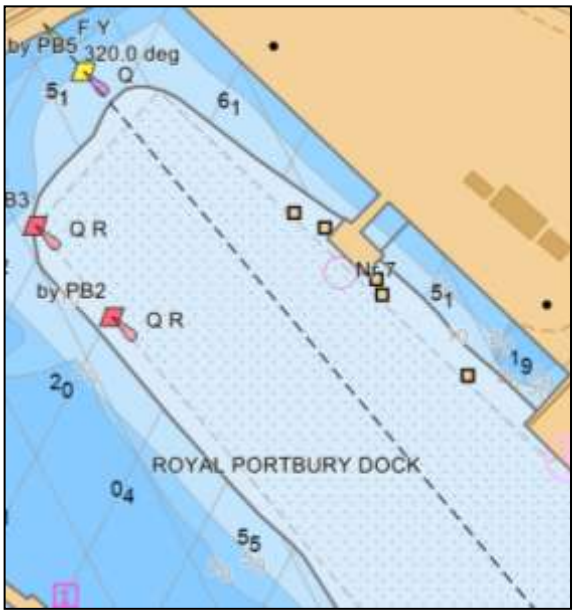
Example :

Input values

orientation= 320
valueOfNominalRange = 5

DL(LS(DASH,1,CHBLK),orientation,valueOfNominalRange)

The instruction above draws a line on a bearing of 140 degrees for a distance of 5 miles, as shown below.



1.3.3 Complex Attribute

In order to support display based on the values contained in sub attributes of complex attributes a new construct is required. The function below provides a means to specify a complex attribute for which each instance present on a feature is processed using the symbol instruction specified within the function.

ATTR The name of the complex attribute to be processed.

INSTR The symbol instruction to be processed for each complex attribute instance.

Example:

CA(lightSector,DS(sectorLimitOne,sectorLimitTwo,sectorExtension,colour))

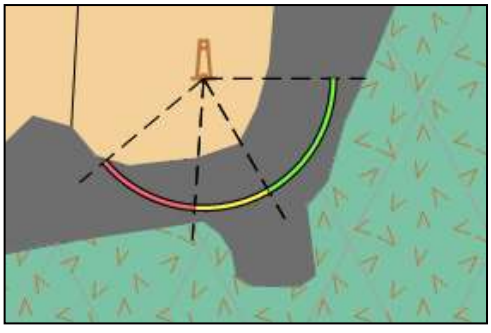
Example:

Feature – Multisectored light
Complex attribute
lightSector(1) – sectorLimitOne= 4
sectorLimitTwo= 50
colour= Red

lightSector(2) – sectorLimitOne= 330
sectorLimitTwo= 004
colour= White

lightSector(3) – sectorLimitOne= 270
sectorLimitTwo= 330
colour= Green

The above instruction and input parameters would result in the drawing of the following sectors.



2.0 Revised Rules

This section provides revised portrayal rules as look up table entries. New constructs and attributes/features are highlighted in yellow for clarity. In this document text instructions have been included for sectored lights, these may not be required. Currently in S-52 light descriptions do not display for sectored lights “because it would cause clutter” (LIGHTS05 Cont B).

2.1 All round single sectored light

General case. (LUT entries need repeating for each colour)

A default case and a case for where flareAngle is not populated and the default 45 is used. Another case where flare is rotated as the text instruction differs between these two cases. The final case covers major lights which draw with an all round arc/circle.

```
"AllRoundSingleSectoredLight","","SY(LITDEF11); TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"AllRoundSingleSectoredLight","colour3","SY(LIGHTS11);TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"AllroundSingleSectoredLight","colour3flareAngle","SY(LIGHTS11,flareAngle);TX('lightDescription',3,2,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"

"AllroundSingleSectoredLight","majorLighttrue","DS(,,sectorExtension,colour);TX('lightDescription',3,2,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"
```

2.1.1 Single Sectored

In the current model the complex attribute sector is used to group sector limit one and two. In order to navigate to sub attribute values within a symbol instruction the following convention is used;

Complex attribute:Sub attribute e.g. sector:sectorLimitOne

```
"AllRoundSingleSectoredLight","sector","DS(sector:sectorLimitOne,sector:sectorLimitTwo,sectorExtension,colour); TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"
```

Limitations

This item is affected by the same limitations as multi sectored light see 2.2 for details.

2.1.2 Floodlight/Spotlight

Floodlight/Spotlight require two Look up table entries and are carried on the single sectored/all round light in S-101.

```
"AllRoundLight","categoryOfLight8","SY(LIGHTS82);
TX('lightDescription',3,1,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"

"AllRoundLight","categoryOfLight11","SY(LIGHTS82);
TX('lightDescription',3,1,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"
```

2.1.3 Strip Light

Strip light requires a single Look up table entry and is carried on the single sectored/all round light in S-101.

```
"AllRoundLight","categoryOfLight9","SY(LIGHTS81);
TX('lightDescription',3,1,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"
```

2.2 Multisectored Light

New feature specifically for multisectored lights.
New attribute 'light Description' includes light description within the data removing LITDSN01.
Both the new complex attribute instruction and draw sector instructions are used here. The complex attribute construct processes all lightSector complex attributes and draws sectors for each.

```
"MultiSectoredLight","","CA(lightSector,DS(sectorLimit1,sectorLimit2,sectorExtension,colour);
TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"
```

Limitations

Currently fully extended sector lines are not catered for, the DS instruction could be extended to cater for these by adding a parameter to which valueOfNominalRange is passed.

Is this extension to the DS instruction the optimum solution?

Currently the requirement to use a different sector style for obscured, faint and partially obscured lights is not catered for. As Light Visibility is a sub attribute the CA instruction would need to be extended to include an attribute value combination. Also the DS instruction could be extended to carry a linestyle instruction. This could be further extended to include the linestyle instructions for each element of the sector arc e.g.

CA(complexattribute,*subattributevalue*,DS(sectorlinestyle,arcstyle,sectorLimitOne,sectorLimitTwo,sectorExtension,colour))

CA(lightSector,lightVisibility7,DS(LS(DASH, 1, CHBLK), LS(DASH, 1, CHBLK),sectorLimitOne,sectorLimitTwo,sectorExtension,colour))

Would extending the CA and DS instructions be the optimum solution?

2.3 Directional Light

New feature specifically for directional lights.
New attribute 'light Description' includes light description within the data removing LITDSN01.
Flare angle not required in this case as orientation is used.
(Example LUTs below need repeating for different colours)

Should Moire effect lights display differently as on paper charts?

```
"DirectionalLight","","SY(LITDEF11);TE('%3.0lfdeg','orientation',3,3,3,'15110',3,1,CHBLK,23);TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"DirectionalLight","colour3","DL(LS(DASH,1,CHBLK),orientation,valueOfNominalRange);SY(LIGHTS11,orientation);TE('%3.0lfdeg','orientation',3,3,3,'15110',3,1,CHBLK,23);TX('lightDescription',3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"
```

2. Fog light

New feature specifically for fog lights in S-101.
New attribute ‘light Description’ includes light description within the data removing LITDSN01.
New attribute ‘flareAngle’ provides light flare angle reducing CSP complexity.
(Example LUTs below need repeating for different colours)

These table entries cover the default case and where flareAngle is 45 and flarAngle being any other value as these cases have different text instructions.

"FogLight","","SY(LITDEF11); TX(‘lightDescription’,3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"FogLight","colour3flareAngle45","SY(LIGHTS11,flareAngle);TX(‘lightDescription’,3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"FogLight","colour3flareAngle","SY(LIGHTS11,flareAngle);TX(‘lightDescription’,3,2,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"

2.5 Air obstruction light

New feature specifically for Air Obstruction Light in S-101.
New attribute ‘light Description’ includes light description within the data removing LITDSN01.
New attribute ‘flareAngle’ provides light flare angle reducing CSP complexity.
(Example LUTs below need repeating for different colours)

"AirObstructionLight","","SY(LITDEF11); TX(‘lightDescription’,3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"AirObstructionLight","colour3flareAngle45","SY(LIGHTS11,flareAngle);TX(‘lightDescription’,3,1,3,'15110',2,-1,CHBLK,23)","8","O","STANDARD","27070"

"AirObstructionLight","colour3flareAngle","SY(LIGHTS11,flareAngle);TX(‘lightDescription’,3,2,3,'15110',2,0,CHBLK,23)","8","O","STANDARD","27070"

3.0 Clarifications to S-52 CSPs

LITDSN01

1. Light period clarification required following discussion at TSMAD24/DIPWG4

LIGHTS05

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