Paper for Consideration by TSM3

S-101 Test Datasets for the unloading and loading scenarios

Submitted by:	S-100 Working Group Chair
Executive Summary:	This paper provides a brief overview of the S-101 test datasets that were created for the data loading and unloading scenarios.
Related Documents:	S-101 Product Specification
Related Projects:	S-100 Test Bed

Introduction / Background

One of the new concepts that have been introduced in S-101 is a new algorithm to handle dataset loading and unloading. This algorithm is based on producer defined dataset display scales and depending on the mariner's selected viewing scale the data will load and unload within the navigation system. In order, to validate this algorithm a series of test datasets have been created to support various scenarios. This paper provides an overview of the different test datasets that will support testing of the data loading and unloading algorithm.

Analysis/Discussion

These datasets have been initially created in S-57 and must be converted to S-101 using the S-57 to S-57 convertor. In addition, these dataset also include an S-100 compliant XML exchange catalogue.

The following table outlines the parameters used in the creation of the test datasets:

Dataset Loading and Unloading Scenarios

S-101 Clause	S-101 Name	EDTN	S-101 Maximum Display Scale	S-101 Minimum Display Scale	Notes
4.7	AADLULGD01	0	12,000	90,000	This cell has a main dataCoverage and two additional dataCoverages within the cell. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should represent cells needed to go into a port with larger scale data representing the port itself. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. NOTE: Cells 01,02,03 should be in the same geographic area.
		Insets	2,000	90,000	
			4,000	90,000	
4.7	AADLULGD02	0	90,000	350,000	This cell has a main dataCoverage and two additional dataCoverages within the cell. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The main cell should represent medium scale coverage with larger scale data representing the port itself. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. NOTE: Cells 01,02,03 should be in the same geographic area.
		Insets	12,000	350,000	
			45,000	350,000	
4.7	AADLULGD03	0	180,000	1,500,000	This cell has a main dataCoverage and two additional dataCoverages within the cell.
		Insets	90,000	1,500,000	

			350,000	1,500,000	NOTE: Cells 01,02,03 should be in the same geographic area. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The main cell should represent small scale coverage with larger scale data representing areas of greater detail.
4.7	AADLULBD01	0	12,000	90,000	This cell has a main dataCoverage and two additional dataCoverages within the cell. NOTE: These cells can be the same data as the good scenarios, it is just the values for the maximum display scales that change. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The main cell should represent small scale coverage with larger scale data representing areas of greater detail.
		Insets	2,000	45,000	
			4,000	22,000	
4.7	AADLULBD02	0	90,000	350,000	This cell has a main dataCoverage and two additional dataCoverages within the cell.
		Insets	12,000	90,000	

			12,000	45,000	NOTE: These cells can be the same data as the good scenarios, it is just the values for the maximum display scales that change. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The main cell should represent small scale coverage with larger scale data representing areas of greater detail.
4.7	AADLULBD03	0	180,000	1,500,000	This cell has a main dataCoverage and two additional dataCoverages within the cell. NOTE: These cells can be the same data as the good scenarios, it is just the values for the maximum display scales that change. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The main cell should represent small scale coverage with larger scale data representing areas of greater detail.
		Insets	12,000	45,000	
			350,000	1,500,000	
4.7	AADLULBD04	0	12,000	90,000	This cell has a main dataCoverage and theeadditional dataCoverages within the cell. The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should represent cells needed to go into a port with larger scale data representing the port itself. NOTE: Because these will be created using S-57 and converted set the CSCL and M_CSCL values to the S-101 Maximum Display Scale. NOTE: You can use AAULDLGD01 and add an extra inset.
			2,000	90,000	
			4,000	90,000	
			4,000	90,000	
4.7	AADLULGD04	0	12,000	45,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should also have a dataset limit that is larger than the dataCoverage Limit. The dataCoverage limit needs to be coincident with the dataCoverage limit of AADLULGD05. In this case it is only the dataset limits that overlap.

4.7	AADLULGD05	0	12,000	90,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should also have a dataset limit that is larger than the dataCoverage Limit. The dataCoverage limit needs to be coincident with the dataCoverage limit of AADLULGD04. In this case it is only the dataset limits that overlap.
4.7	AADLULGD06	0	12,000	45,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should also have a dataset limit that is larger than the dataCoverage Limit. The dataCoverage limit needs to be coincident with the dataCoverage limit of AADLULGD05. In this case it is only the dataset limits that overlap. Use the cells from AADLULGD04 and AADLULGD05 as the base and add the inset.
		Inset	2,000	45,000	
4.7	AADLULGD07	0	12,000	90,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. It should also have a dataset limit that is larger than the dataCoverage Limit. The dataCoverage limit needs to be coincident with the dataCoverage limit of AADLULGD04. In this case it is only the dataset limits that overlap. Use the cells from AADLULGD04 and AADLULGD05 as the base and add the inset.
		Inset	2,000	90,000	
4.7	AADLULBD05	0	12,000	45,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The dataCoverages for AADLULGD06 and 07 should have a small overlap. Use the cells from AADLULGD04 and AADLULGD05 as the base and add the inset.
		Inset	2,000	45,000	
4.7	AADLULBD06	0	12,000	90,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. The dataCoverages for AADLULGD06 and 07 should have a small overlap. Use the cells from AADLULGD04 and AADLULGD05 as the base and add the inset.
Inset			2,000	90,000	

4.7	AADLULBD07	0	12,000	45,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. Use the cells from AADLULGD04 and AADLULGD05 as the base and then overlap between AADLULBD08 and 07
4.7	AADLULBD08	0	12,000	90,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation. Use the cells from AADLULGD04 and AADLULGD05 as the base and then overlap between AADLULBD08 and 07
4.7	AADLULGD08	0	2,000	45,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation.
4,7	AADLULGD09	0	12,000	90,000	The cell should contain LNDARE,SLCONS,DEPARE, SOUNDG, and some aids to navigation.
4.7	AADLULCN01	0	12,000	90,000	Nested datasets
		Insets	4,000	90,000	
			2,000	90,000	
4.7	AADLULCN02	0	12,000	90,000	Nested datasets, although one is offset
		Insets	4,000	90,000	
			2,000	90,000	
4.7	AADLULCN03	0	12,000	90,000	Nested datasets, although one is offset. Also the dataset boundary is extended beyond the dataCoverage boundary
		Insets	4,000	90,000	
			2,000	90,000	
4.7	AADLULCN04	0	12,000	90,000	dataCoverages overlap within the cell
		Insets	4,000	90,000	
			2,000	90,000	

Common Metadata elements for use within the dataset and XML catalogue:

S-101 Dataset

Name	Multiplity	Value	Type	Remarks
S101_DataSetDiscoveryMetadata	-		-	-
metadataFileIdentifier	1	MD_AAULDL01_000 MD_AAULDL02_000 MD_AAULDL03_000 Etc….	CharacterString	The file name must be unique. Each file name must have a MD prefix added to the S-101 file name. Dataset: GB45678.000 Metadata: MD_GB45678_000.xml Update 1: GB45678.001 Metadata: MD_GB45678_001.xml
metadataPointOfContact	1	International Hydrographic Orangization	CI_ResponsibleParty	
metadataDateStamp	1		Date	
metadataLanguage	1	English	CharacterString	All datasets conforming to S-101 PS must use English language
fileName	1		CharacterString	Dataset file name
filePath	1		CharacterString	Path to the dataset file, relative to the root directory of the exchange set. The location of the dataset file after the exchange set is unpacked into directory <EXCH_ROOT> will be: <EXCH_ROOT>/<filePath>/<fileName>
description	1	This dataset is for use in testing the S-101 product specification	CharacterString	Short description of the area covered by dataset harbour or port name, between two named locations etc. NATIONAL LANGUAGE enabled

Name	Multiplity	Value	Type	Remarks
dataProtection	1	False	Boolean	True = Encrypted False = Unencrypted A value of True indicates the presence of encryption. Otherwise, the value must be False
protectionScheme	0..1		CharacterString	e.g. S-63
digitalSignature	1		CharacterString	
copyright	0..*		MD_LegalConstraints ->MD_RestrictionCode <copyright> (ISO 19115)	
classification	1	{1}	Class MD_SecurityConstraints>MD_ClassificationCode (codelist)	1. unclassified 2. restricted 3. confidential 4. secret 5. top secret
purpose	1	{1}	CharacterString MD_Identification>purpose (character string)	1. New Dataset 2. New Edition 3. Update 4. Re-issue 5.Cancellation
specificUsage	1	1 = minimum display scale is less than 90,000 2 = minimum display scale is less than 350,000	CharacterString MD_USAGE>specificUsage (character string)	1. Port Entry – A dataset containing data required: For navigating the approaches to ports for navigating within ports, harbours, bays,

Name	Multiplity	Value	Type	Remarks
		3 = minimum display scale is less than 1,500,000	MD_USAGE>userContactInfo (CI_ResponsibleParty)	rivers and canals, for anchorages as an aid to berthing or any combination of the above. 2.Transit – A dataset containing data required for : navigating along the coastline either inshore or offshore navigating oceans, approaching coasts route planning or any combination of the above. 3.Overview – A dataset containing data required: for Ocean Crossing route planning
editionNumber	1	1	CharacterString	When a dataset is initially created, the edition number 1 is assigned to it. The edition number is increased by 1 at each new edition. Edition number remains the same for Update and Re-issue. Values can must be an integer from 0 to 9.
updateNumber	1	0	CharacterString	Update number 0 is assigned to a new dataset. Values can must be an integer from 0 to 9.
updateApplicationDate	0..1		Date	this date is only used for the base dataset files (i.e. new datasets, re-issue and newedition), not update dataset files. All updates dated on or before this date must have been applied by the producer
issueDate	1		Date	Date on which the data was made available by the data producer.

Name	Multiplity	Value	Type	Remarks
productSpecification	1	S-101 version X.X.X	S100_ProductSpecification	This must be encoded as S-101.X.X.X – with the X representing the version number
producingAgency	1	International Hydrographic Organization	CI_ResponsibleParty	Agency responsible for producing the data.
maximumDisplayScale	1	{1} to {15}	Integer	1: 1,000 2: 2,000 3: 3,000 4: 4,000 5: 8,000 6: 12,000 7: 22,000 8: 45,000 9: 90,000 10: 180,000 11: 350,000 12: 700,000 13: 1,500,000 14: 3,500,000 15: 10,000,000
horizontalDatumReference	1	EPSG	CharacterString	
horizontalDatumValue	1	4326	Integer	WGS84
verticalDatum	1	{16}	S100_VerticalAndSoundingDatum	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum

Name	Multiplity	Value	Type	Remarks
				25 : International Great Lakes Datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)
soundingDatum	1	{12}	S100_VerticalAndSoundingDatum	1 : Mean low water springs 2 : Mean lower low water springs 3 : Mean sea level 4 : Lowest low water 5 : Mean low water 6 : Lowest low water springs 7 : Approximate mean low water springs 8 : Indian spring low water 9 : Low water springs 10 : Approximate lowest astronomical tide 11 : Nearly lowest low water 12 : Mean lower low water 13 : Low water 14 : Approximate mean low water 15 : Approximate mean lower low water 16 : Mean high water 17 : Mean high water springs 18 : High water 19 : Approximate mean sea level 20 : High water springs 21 : Mean higher high water 22 : Equinoctial spring low water 23 : Lowest astronomical tide 24 : Local datum 25 : International Great Lakes Datum 1985 26 : Mean water level 27 : Lower low water large tide 28 : Higher high water large tide 29 : Nearly highest high water 30 : Highest astronomical tide (HAT)
dataType	1	ISO 8211 BINARY	S100_DataFormat	
otherDataTypeDescription	0..1		CharacterString	
dataCoverage	1..3		S101_DataCoverage	Provides information about data coverages within the dataset

S101_DataCoverage

Each data coverage within the data set must have a record.

Name	Multiplicity	Value	Type	Remarks
S101_DataCoverage	-	-	-	-
ID	1		Integer	Uniquely identifies the coverage
boundingBox	1		EX_GeographicBoundingBox	
boundingPolygon	1..*		EX_BoundingPolygon	
maximumDisplayScale	1	{1} to {15}	Integer	1: 1,000 2: 2,000 3: 3,000 4: 4,000 5: 8,000 6: 12,000 7: 22,000 8: 45,000 9: 90,000 10: 180,000 11: 350,000 12: 700,000 13: 1,500,000 14: 3,500,000 15: 10,000,000
minimumDisplayScale	1	{1} to {15}	Integer	1: 1,000 2: 2,000 3: 3,000 4: 4,000 5: 8,000 6: 12,000 7: 22,000 8: 45,000 9: 90,000 10: 180,000 11: 350,000 12: 700,000 13: 1,500,000 14: 3,500,000 15: 10,000,000

Exchange Catalogue File Metadata

The catalogue file is defined in XML schema language. The Exchange catalogue inherits the dataset discovery metadata and support file discovery metadata.

Name	Multiplicity	Value	Type	Remarks
S101_ExchangeCatalogue	-			An exchange catalogue contains the discovery metadata about the exchange datasets and support files
identifier	1		CharacterString S100_CatalogueIdentifier	Uniquely identifies this exchange catalogue
editionNumber	1		CharacterString	The edition number of this exchange catalogue
contact	1	International Hydrographic Organization	S100_CataloguePointofContact CI_ResponsibleParty	
catalogueDate	1		Date	Creation date of the exchange catalogue
metadataLanguage	1	English	CharacterString	All datasets conforming to S-101 PS must use English language
exchangeCatalogueName	1	CATALOG.101	CharacterString	Catalogue filename
exchangeCatalogueDescription	1	This catalogue represents the collection of datasets to test the data loading and unloading strategy as defined in S-101	CharacterString	Description of what the exchange catalogue contains NATIONAL LANGUAGE enabled
productSpecification	1	0.0.0		S-101 Version Number
exchangeCatalogueComment	0..1		CharacterString	Any additional Information NATIONAL LANGUAGE enabled
publicKeys	1..*		characterString	
sourceMedia	1		characterString	
replacedData	1		Boolean	If a data file is cancelled is it replaced by another data file
dataReplacement	0..1		characterString	Dataset name

S100_CatalogueIdentifier

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_CatalogueIdentifier	An exchange catalogue contains the discovery metadata about the exchange datasets and support files	-	-	-
Attribute	identifier	Uniquely identifies this exchange catalogue	1	CharacterString	
Attribute	editionNumber	The edition number of this exchange catalogue	1	CharacterString	
Attribute	date	Creation date of the exchange catalogue	1	Date	

S100_CataloguePointOfContact

Role Name	Name	Description	Mult	Type	Remarks
Class	S100_CataloguePointOfContact	Contact details of the issuer of this exchange catalogue	-	-	-
Attribute	organization	The organization distributing this exchange catalogue	1	CharacterString	This could be an individual producer, value added reseller, etc.
Attribute	phone	The edition number of this exchange catalogue	0..1	CI_Telephone	
Attribute	address	The address of the organization	0..1	CI_Address	

The following excerpt is the guidance outlined in S-101 regarding the dataset loading and unloading algorithm.

4.7 Dataset Loading and Unloading

A new algorithm based on producer defined dataset display scales (minimum and maximum) for dataset loading and unloading within a navigation system is prescribed in S-101 in order for the appropriate ENC to be viewed at the mariner's selected viewing scale. This will simplify the process for navigation systems, giving clear and concise rules on how and when data is loaded and unloaded. The concept of navigation purpose is restricted for use in presenting ENCs in a visual catalogue and must not be used for determining with dataset should be displayed.

4.7.1 Dataset Loading and Unloading Algorithm

This clause defines the dataset loading and unloading algorithm for use within navigation systems.

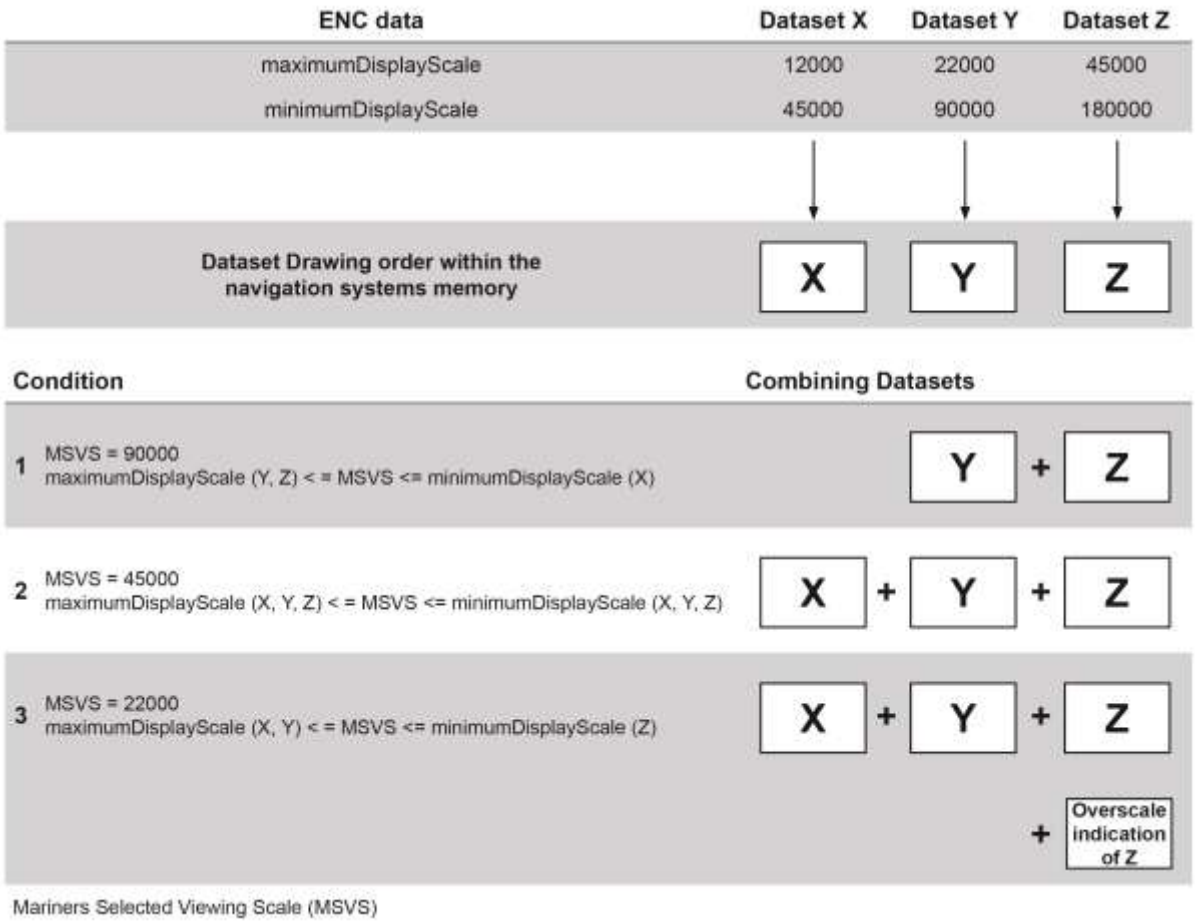

Figure 1 - Data Loading and Unloading Algorithm

In order for systems to properly load and unload data as the mariner is zooming in and out using the mariner's selected viewing scale (MSVS) the following algorithm must be used.

1. Create selection List

a. All **Data Coverage** areas within the graphics window within scale range (covered by the MSVS) are firstly ordered by **maximum Display Scale** and secondly by the largest percentage of coverage if **Data Coverage** areas have the same **maximum Display Scale**

b. All other smaller scale **Data Coverage** areas within the graphics window are firstly ordered by **maximum Display Scale** and secondly by the largest percentage of coverage if **Data Coverage** areas have the same **maximum Display Scale**

c. The display order is from the smallest **maximum Display Scale** to the largest **maximum Display Scale**, i.e. the **Data Coverage** area with largest **maximum Display Scale** will be displayed with the highest priority

2. If the MSVS is larger than the **maximum Display Scale** of an area within the window, turn on overscale indication.

3. If the mariner selects an individual dataset to load it must be displayed at its **maximum Display Scale**, i.e. MSVS is set to the **maximum Display Scale** of the selected dataset, and then the algorithm is used to fill the graphics window.

The example below works through four scenarios and uses four different types of **Data Coverage** with different **maximum Display Scale** and **minimum Display Scale**. They are denoted as areas A, B, C and D.

NOTE: this example is applicable to multiple datasets with overlapping **Data Coverages**.

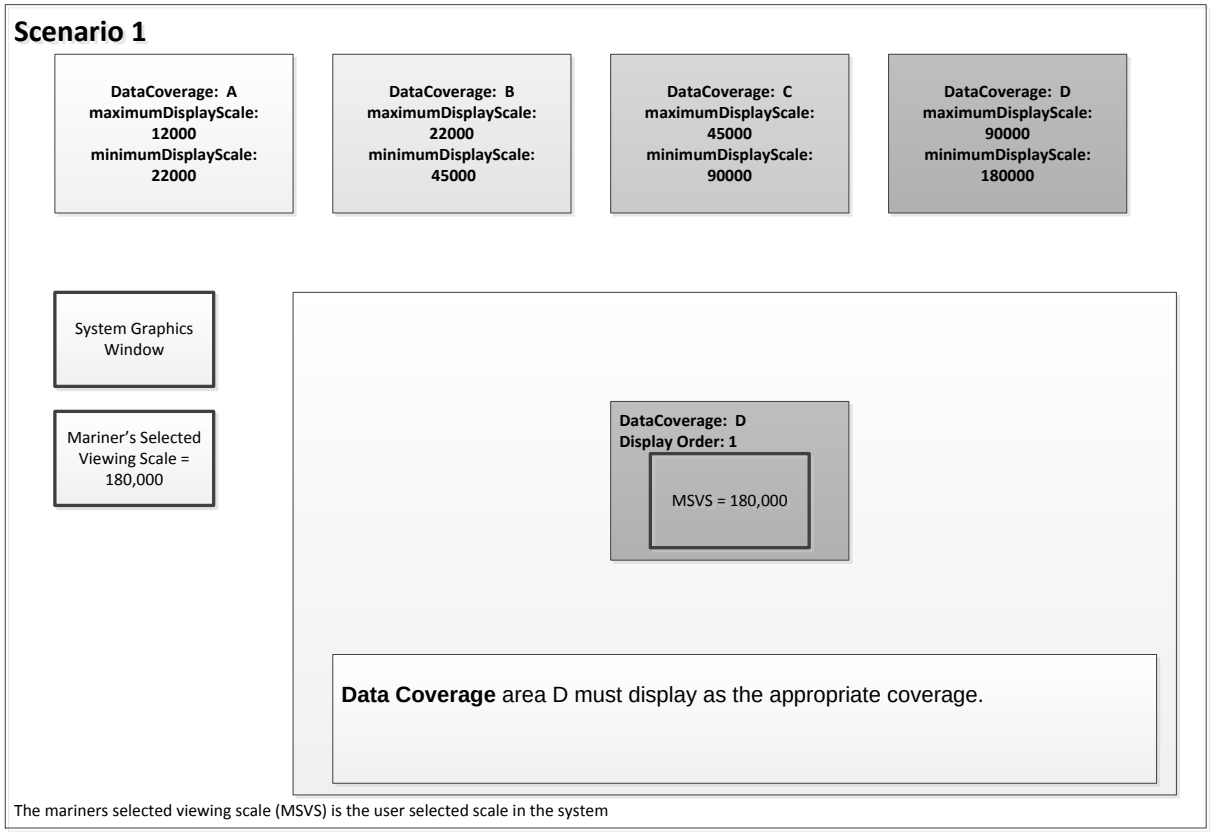

Figure 2 – Scenario 1: Simple Data Coverage Display

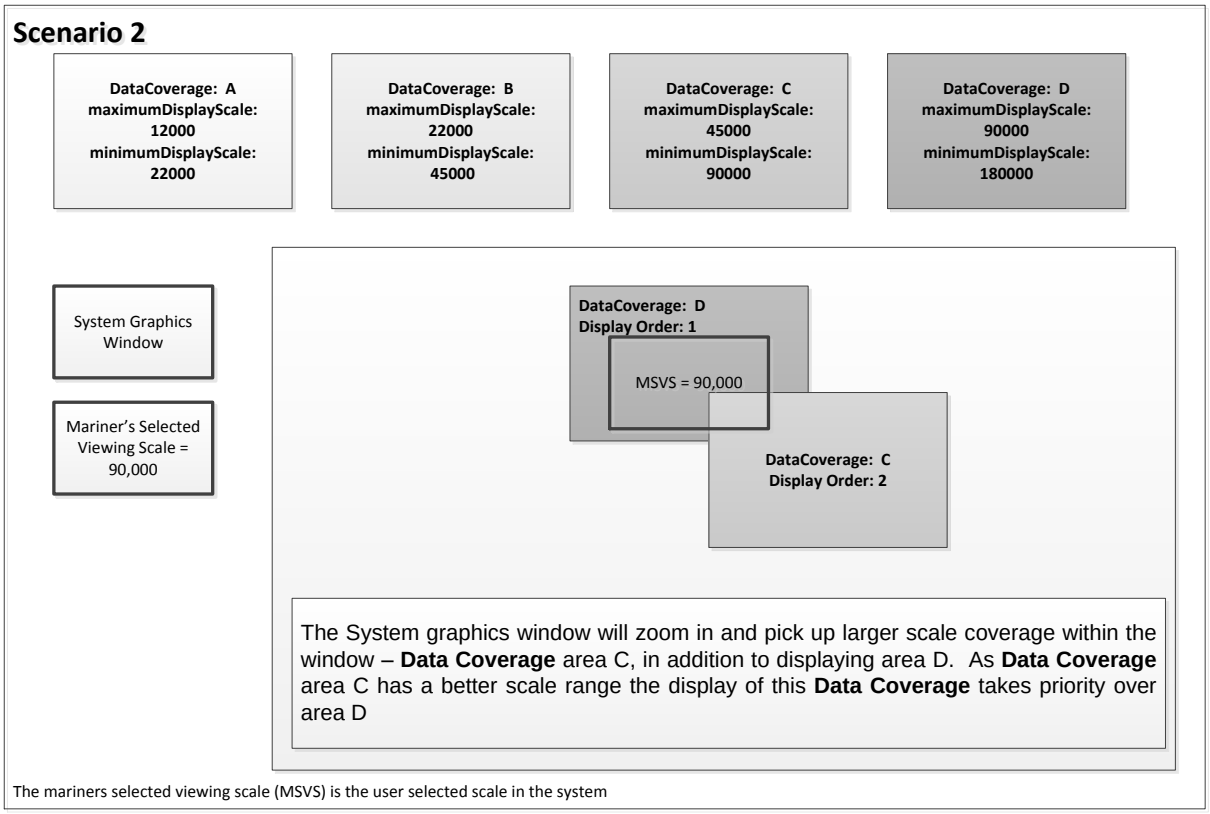

Figure 3 - Scenario 2: Display of two different overlapping Data Coverages

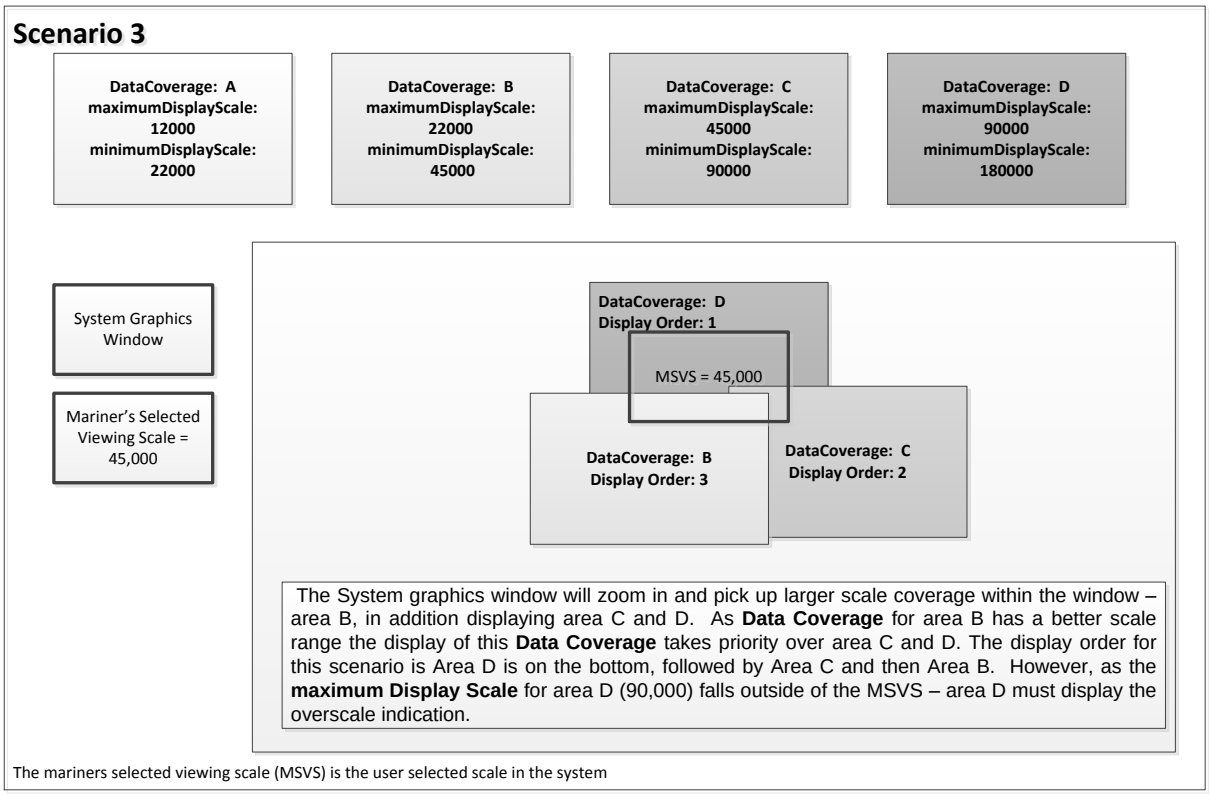

Figure 4 - Scenario 3: Display of three different overlapping Data Coverages

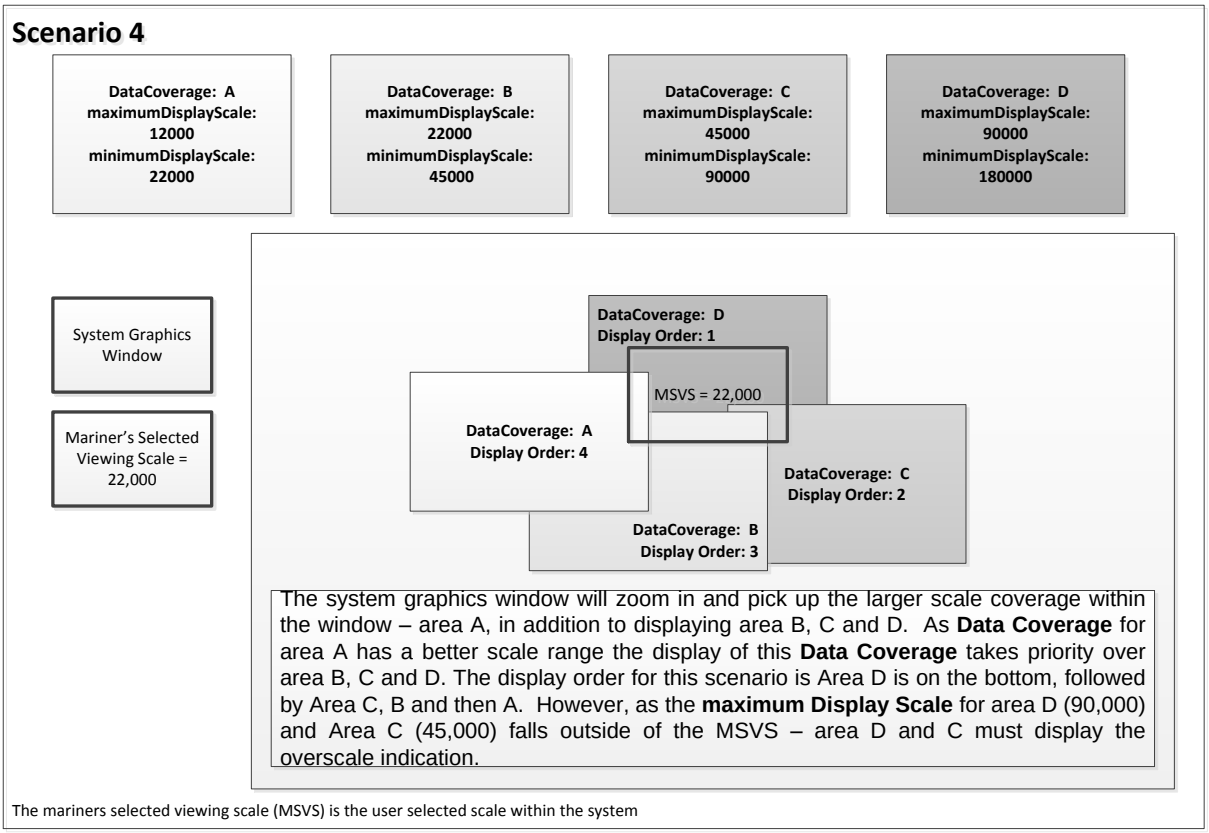

Figure 5 - Scenario 4: Display of four different overlapping coverages