FAT Test Cases

General comments

1. Under “Requirement reference” EF=Efficient Flow requirement, STM=STM requirement (requirement list can be found here: https://service.projectplace.com/pp/pp.cgi/r1561583662)
2. Where it says PPU, it could as well be ECDIS

General Prerequisites:

1. One PPU test object
2. One opposing PPU, simulated position[1] data and AIS data (In bridge Simulator).
3. One ship pre-programmed track to be followed geographically and speeds, “ship speed” shall on some legs be different from the pre-planned speeds in PPU.

[1] See picture on last page for details

1. Two PPUs Sharing Routes with each other

Prerequisites:

1. Two PPUs registered in MCP STAGING
2. The two PPUs registered in EF Hub
3. EF Hub: AIS data for the two boarded ships existing with speed and in area in EF Hub "AIS stream/DB"
4. Pilot Plug Transmitter for each PPU (Not Applicable for ECDIS test)
5. Simulated ships to be configured to have a MMSI aligned with the information in the EF Hub
6. Routes prepared and activated in each PPU

(In below testcase, PPU#1 is the test object, PPU#2 is seen to be surrounding equipment for feeding of information)

Test Point #	Expected Result	Requirement Reference	Fail/Pass
1.1. PPU# 1 Boarding (Connecting to "Pilot Plug Transmitter").	• Question if Pilot is piloting "this" ship shall be asked. • If the pilot answer yes on above, piloted ship´s MMSI# shall be added to the RTZ shared from the PPU, also the ship´s name shall be added into the RTZ	3.1 EF PPU 3.16 EF PPU	NB, not applicable for ECDIS test
1.2. Piloted ship´s RTZ is automatically shared with EF-Hub service (EFHS).	• PPUs RTZ shall be "available" in EFHS. • PPU#1´s RTZ shall be available in PPU#2	3.2 EF PPU	
1.3. PPU#2 also shares RTZ with EFHS.	• PPU #2´s RTZ shall be possible to view in PPU#1. • Above mentioned shared RTZs shall Only be visible if operator of the receiving unit has chosen to view it.	3.2 EF PPU	

	• There shall not be any message about that the above RTZ is received in "own PPU"		
1.4. PPU#1 and PPU#2 (pilots) is disembarking from the ships	• When the PPU#1 and PPU#2 have not received any data from the ship for the last 5 minutes the PPU shall send the Monitored route in route status "Inactive" to the EFHS	NA	
1.5. PPUs internet connection goes down	• In order to inform the pilot that no information is distributed or received from the EFHS or other actors in STM (EF), there shall be an indication of that internet is down.	NA	

2. Meeting between two ships

Prerequisites:

1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed
4. Preprogramed targets (50) < adjustable small target limit with AIS shall be available for testing of filtering functionality

Test Point #	Expected Result	Requirement Reference	Fail/Pass
2.1. PPU#1 and PPU#2 shall calculate meeting points.	• Meeting point shall be calculated by means of own ship (PPU) route incl. planned speeds and other ship´s route including planned speeds, if the other ship´s route doesn't contain a schedule, the colour of the meeting point shall be different (To show that the accuracy of the meeting point might not be so high).	3.4 EF PPU 3.5 EF PPU 3.13 EF PPU	
2.2. 2 ship´s planned meeting position is further away than a set value. (e.g. one of the ship´s on route of one side of an island, the other ship´s route is on the other side of an island resulting in that "route CPA" is	• Meeting point symbol shall have a distinctive colour, showing if above or below set value.	NA	

above set value) meeting point shall have different colour.			
2.2.1. Above value, shall be adjustable	• Colour of meeting point symbol shall change colour when value is adjusted to be above/below current "route CPA" value	NA	
2.3. Adjust meeting points location along own route	• New speed for own ship/other ship shall be calculated and presented	3.8 EF PPU	
2.3.1. Is the speed trial manoeuvre using the other ships route/speed when calculating the meeting point?	• Other ships route including speed shall be used when calculating meeting point	3.3 EF PPU 3.8 EF PPU	
2.4. Meeting point is located between two waypoints where meeting is set to be restricted	• The software **shall** have an audible and visual warning function for the meeting point. Audible warning functionality shall be possible to turn off.	3.9 EF PPU	
2.5. Several small boats creates meeting points along own ship route.	• Meeting points with ships under a settable limits shall have a different colour	3.7 EF PPU 3.10 EF PPU	

3. Ship deviates from shared route

Prerequisites:

1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise. “Ship speed” shall on some legs be different from the pre-planned speeds in PPU.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed

3.1. PPU#2´s ship is not following planned speeds.	• Warning (different colour of meeting point, visual alarm and audible alarm) shall indicate that the calculated meeting point is not 100% trustworthy due to that the other ship is not following its pre-planned (and shared) speeds.	3.15 EF PPU	
3.1.1. Set delta value that trigger above alert	• Warning shall disappear if settable delta value is set to a higher value then what the speed difference between the other ships actual speed and planned speed is.	3.15 EF PPU	
3.1.2. The audible alarm functionality is turned off.	• No audible alarm shall sound, even if the speed difference between the other ships actual speed and planned speed is above the set delta value.	3.15 EF PPU	
3.1.3. The visual alarm is triggered	• The visual alarm shall not interfere with the navigation.	3.15 EF PPU	

4. One ship overtaking another ship

Prerequisites:
1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed Two PPUs Sharing Routes with each other

Test Point #	Expected Result	Requirement Reference	Fail/Pass
4.1. Ship with PPU#1 is overtaking ship with PPU#2	• Overtaking point calculated on the other ship´s RTZ shall be calculated/displayed regardless if the two ships heading are diverging	3.4 EF PPU	
4.1.1. Overtaking point is calculated	• The Overtaking point shall be calculated by means of using "own ships" route and planned speeds and the "other ships" route and planned speeds. • The Overtaking point shall be possible to be separated visually from a meeting point.	3.4 EF PPU NA	

5. Two ships travelling in fairways that will cross.

Prerequisites:

1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed.

Test Point #	Expected Result	Requirement Reference	Fail/Pass
5.1. Ship with PPU#1 is crossing/joining the fairway that ship with PPU#2 is using	• Crossing point calculated on the other ship´s RTZ shall be calculated/displayed regardless if the two ships heading are diverging	3.4 EF PPU	
5.1.1. The crossing point is calculated	• The crossing point shall be calculated by means of using “own ships” route and planned speeds and the “other ships” route and planned speeds. • The crossing point shall be possible to be separated visually from a meeting point.	3.4 EF PPU NA	

6. VTS Sending out STM Text Areas to PPU/ECDIS

Prerequisites:
1. One EF Online PPU
2. VTS being able to construct and send STM Text areas to PPU/ECDIS

Test Point #	Expected Result	Requirement Reference	Fail/Pass
6.1. VTS Creates and sends a STM Text message containing a text and a position[2] to PPU#1	• Position and text shall be displayed on chart in PPU#1	3.14 EF PPU	
6.1.1. Text message received in PPU	• There shall be a message about that a textmessage has been received in PPU	3.14 EF PPU	
6.1.2. Supressing of a specific textmessage	• It shall be possible to suppress a textmessage • It shall be possible to “unsupress” (display) the textmessage again	NA	
6.1.3. The text and position is not valid anymore	• The text and position shall automatically be deleted when not valid anymore	3.14 EF PPU	
6.2. VTS Creates and sends a STM Text message containing	• Polygon and text shall be displayed on chart in PPU#1	3.14 EF PPU	

[2] Text: ”Bouy adrift”, Position: N 59 20.1055 E 18 47.5116

a text and a polygon to [3]PPU#1			
6.2.1. Text message received in PPU	• There shall be a message about that a textmessage has been received in PPU	3.14 EF PPU	
6.2.2. Supressing of a specific textmessage	• It shall be possible to supress a textmessage • It shall be possible to unsupress (display) the textmessage again	NA	
6.2.3. The text and polygon is not valid anymore	• The text and polygon shall automatically be deleted when not valid anymore	3.14 EF PPU	
6.3. A text message is received without any validity time	The PPU shall reply with a textmessage to sending service (VTS) stating that a validity time is required	NA	

[3] Text: ”Fairway work in progress, swell free passage required” , Polygon Positions: **1**. N 59° 19.3192 E 018° 48.8648, **2**. 59° 18.6958 E 018° 47.8253, **3**. 59° 18.2619 E 018° 50.0940, **4**. 59° 18.9946 E 018° 50.5272

7. Failure tests case

Prerequisites:

1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed.

Test Point #	Expected Result	Requirement Reference	Fail/Pass
7.1. Piloted ship´s shared RTZ is incomplete RTZ, (missing MMSI).	• Message back to PPU from EFHS regarding missing MMSI shall be shown for operator in PPU.	3.1 EF PPU	
7.2. Piloted ship's shared RTZ has incorrect or old schedule	• Message back to PPU from EFHS regarding incorrect or old schedule shall be shown for operator in PPU.	3.1 EF PPU	
7.3. Piloted ship's shared RTZ has no vessel name	• Message back to PPU from EFHS regarding piloted ship´s shared RTZ has no vessel name shall be shown for operator in PPU	3.1 EF PPU	

8. Audible and visual "indications"

Prerequisites:

1. Two PPUs, simulated position data and AIS data (In bridge Simulator).
2. One of the simulated ships shall follow a pre-programmed track geographically and speedwise.
3. Test case #1 (Two PPUs Sharing Routes with each other) to be completed.

Test Point #	Expected Result	Requirement Reference	Fail/Pass
8.1. Indication/Alert/Alarm is triggered because of a preset value is passed (e.g. meeting point inside meeting restriction area)	• Alarm shall be visible and "resettable" • Audible alarm shall be possible to turn off for respective "trigger"	3.9 EF PPU 3.15 EF PPU	

9. List of Abbreviations, Glossary and definitions

9.1. Abbreviations/Glossary

- **AIS: Automatic Identification System**
- **CPA: Closest Point of Approach**
- **ECDIS: Electronic Chart Display and Information System**
- **EFHS: Efficient Flow Hub Service (Route distribution service)**
- **MCP: Maritime Connectivity Platform**
- **MMSI: Maritime Mobile Service Identity**
- **FAT: Factory Acceptance Test**
- **PPU: Portable Pilot Unit**
- **RTZ: Internationally Standardizes route exchange format**
- **STM: Sea Traffic Management**

9.2. Definitions

- **Planned Speed: Speed that on forehand is planned by the pilot/ship to be used along the route, the planned speed might be different on different legs, this shall be reflected in the manual and calculated section of the schedule part in the RTZ**
- **Present Speed: Ship´s actual speed**
- **ETA Calculation shall use this described method: Use present speed until next waypoint, from there ship´s planned speed shall be used, this is to be done the same way when calculating a meeting ship´s ETA to any location along their route, in order to make an accurate meeting point calculation**

10. Simulator FAT setup