



From: IALA

TC03-12.2.1
(VTS56-12.3.5)

To: IEC TC80 WG17

27 September 2024

LIAISON NOTE

Revision of the Route Plan S-421 (IEC 63173-1) and its usage in VTS

1 INTRODUCTION

IALA expresses its appreciation to IEC TC80/WG17 for their liaison note. During the 56th session of the VTS Committee, the use of Route Plan and the application schema in a VTS context was discussed. Furthermore, progress continued on developing a technical service specification for route exchange between VTS and vessels. The VTS-specific route exchange service will be based on S-421 (IEC 63173-1), and the VTS Committee will provide updates on these developments to IEC TC80/WG17, as requested in their liaison note.

2 RESPONSE OF IEC TC 80 WG 17 TO THE PREVIOUS LIAISON NOTE FROM IALA

The VTS Committee considered the IEC TC80 WG17s solution to the acknowledgement problem that VTS highlighted in our previous liaison note. The VTS Committee welcomes the drafted modifications to IEC 63173-1 documentation related to RouteInfo element and notes that these modifications seem to resolve the problem in the current version of IEC 63173-1.

3 VTS COMMITTEE CONTRIBUTION TO VTS SERVICE SCENARIO FOR IEC DOCUMENT

The route and schedule (The current format, IHO S-421, used for route exchange and also containing schedule information) is a key element of the vessel's voyage and can be used to optimize safety and processes, as well as for the interaction of participants and stakeholders. The core element of the voyage plan is a route. The exchange of routes between vessel to vessel and vessel to shore may improve: situational awareness for the purpose of facilitating;

- reduced number of accidents and incidents (proactively de-conflicting situations when intentions are known and shared);
- optimized resource utilization by knowing the intentions of other actors;
- secured passages by knowing the intentions of other actors;
- predictability of arrivals and departures by early information sharing enabling better planning for involved actors leading to reduced idle time for resources;
- just-in-time operations by enabling stakeholders and service providers to be efficiently organized for handling vessel movements, port resources, and hinterland connections.
 - VTS reporting of arrival/departure times and the specific route in the VTS area.
 - One of the core means for future MASS and other highly automated vessels to communicate intentions and create their sailing plan,
 - Contributor of berth to berth navigation and JIT operations.

It is envisioned that a large number of proposed services within not only the VTS domain will need, use, compute, communicate route and schedule information such as Weather routing, Pilot Routes/passage plans,



Ice navigation services, Fleet management, Remote operations, Reporting, Coastal surveillance and other use cases.

USE CASE 1 - INITIAL SHARING OF THE ROUTE FROM VESSEL TO VTS

Description: Vessel shares route with VTS before entering VTS area, leaving from berth/anchorage, departing from port/anchorage.

Typical sequence:

1. The route is planned in the planning station by the mariner
2. Planning station crosschecks the route and uploads route to the ECDIS/ECS
3. The ECDIS/ECS should send the route to the “Route Exchange Service” before departure, but the route must be shared at the latest according to local rules
4. The Route Exchange Service checks that at least the following information is included in the route
 - Vessel Identification Information
 - Waypoints (WP) including turn radius
 - Schedule/times of WPs
 - Legs (including cross-track distance limit (XTDL)
 - Wheel over point (WOP)
5. The Route Exchange Service sends the route to the VTS System
6. The Route Exchange Service sends “received” acknowledgement automatically
7. VTS System can display the route as needed to the VTS personnel

USE CASE 2 - VTS GIVES ROUTE RECOMMENDATION TO VESSELS WITHIN A GEOGRAPHICALLY DEFINED AREA

Description: VTS gives route recommendation to vessel, for example, due to:

- A certain part of the route is inaccessible, for example, due to navigational danger, environmental conditions, or for monitoring and managing vessel traffic
 - Changing the geography of the route
 - Changing the ETA to a specific waypoint
- Enhanced navigational assistance
 - Changing the radius of the turn

Typical sequence:

1. Vessel has already sent route to VTS
2. VTS personnel creates the recommendation for vessel
 - VTS system can assist VTS personnel to create the route recommendation
3. VTS system sends back the recommended route to ECDIS (planning station)
 - Route can contain changes to waypoints and/or schedule
4. Vessel sends “route received” acknowledgement automatically
5. One of the following
 - a. Vessel does not agree with changes
 - b. Vessel implements changes and sends monitoring route to VTS
6. The Route Exchange Service sends “received” acknowledgement automatically
7. VTS System can display the route as needed to the VTS personnel

USE CASE 3 - VTS REQUESTS ROUTE FROM VESSEL

Description: VTS requests route from vessel for situational awareness and/or traffic management



Typical sequence:

1. VTS requests a route from vessel
2. Vessel sends route as requested
3. The Route Exchange Service sends “received” acknowledgement automatically
4. VTS System can display the route as needed to the VTS personnel with the ability to highlight any changes

USE CASE 4 - VESSEL'S ROUTE CHANGES

Description: Vessel wants to change its route

Typical sequence:

1. Vessel has already sent route to VTS
2. Mariner makes changes to its route
3. ECDIS sends updated information to VTS
 - If VTS has requested updates according to use case 3 that request must be honored
4. VTS system sends “received” acknowledgement automatically
5. VTS System can display the route as needed to the VTS personnel with ability to highlight the changes

USE CASE 5 - VESSEL DOES NOT ARRIVE TO VTS AREA AS PLANNED

Description: Vessel changes route and does not arrive to VTS area as part of its voyage (use case 1)

Typical sequence:

1. Vessel has already sent route to VTS
2. Mariner makes changes the route where no waypoints are located inside geometry area
3. Vessel sends cancellation to VTS system
4. VTS system sends “received” acknowledgement automatically
5. VTS System can display the route as needed to the VTS personnel with ability to highlight the changes/cancellation

USE CASE 6 - VTS APPROVES THE ROUTE

Description: VTS approves vessel's route without changes

Typical sequence:

1. Vessel has already sent route to VTS
2. VTS system sends the route to Route Crosscheck Service (RCS) if available to check the route
3. Route Crosscheck Service checks the route and marks it as compliant
 - If the route is not compliant go to use case 2 or 8
4. VTS personnel takes in consideration the monitoring and managing vessel traffic and marks the route “ok” on the VTS system
 - If the route is not suitable go to use case 2
5. VTS system sends VTS approved route to ECDIS
6. ECDIS can display the VTS approved route to mariner



USE CASE 7 - VTS PERSONNEL APPROVES THE ROUTE

Description: VTS personnel approves vessel's route without changes

Typical sequence:

1. Vessel has already sent route to VTS
2. VTS personnel checks the route and marks the route "ok" on the VTS system
 - VTS personnel also takes in consideration the monitoring and managing vessel traffic
 - If the route is not suitable go to use case 2 or 8
3. VTS system sends VTS approved route to ECDIS
4. ECDIS can display the VTS approved route to mariner

USE CASE 8 - VTS SENDS ROUTE BACK WITH COMMENTS

Description: VTS does not approve vessel's route and sends it back with comments

Typical sequence:

1. Vessel has already sent route to VTS
2. Route Crosscheck Service or/and VTS personnel checks the route and finds issues with the route
3. VTS personnel decides not to make a recommendation
4. VTS sends part of the route with issues back to the vessel with comments
5. Vessel changes its route [go to use case 4]

USE CASE 9 - VESSEL GETS MULTIPLE CHANGES TO THEIR ROUTE

Description: Vessel sends its route to many VTS areas and gets multiple change recommendations to their route.

Typical sequence:

1. Vessel has already sent route to multiple VTS areas
2. VTS areas can give multiple recommendations to vessel's route
 - VTS can send recommended route or/and comments
3. Vessel receives multiple change recommendations to their route and adjusts it accordingly

4 VTS COMMITTEE COMMENTS ON S-421 APPLICATION SCHEMA

During a review of the use cases for Route exchange from a VTS perspective and development of VTS Route Exchange Service Specification the following points have been identified that we would ask IEC TC80/WG17 to address:

1. For VTS it would be very useful to know the wheel over point that is defined on the route by the vessel. VTS Committee investigated the current S-421 model and ended to the conclusion that the best way to describe the wheel over point is by using an S-421 Action point with the RouteActionPointRequiredAction supporting wheel over point. Thus we recommend that the enumeration value 5 for RouteActionPointRequiredAction is changed from reserved for future use to "wheel over point".
2. From a VTS perspective it would be beneficial to be able to easily visualize the changes to the route when route changes are sent from shore to ship or ship to shore after the initial sharing of the full route. To facilitate this functionality for both on onboard and shoreside systems, the ability to only



send changed elements (delta) of the route would present significant savings in both processing time and data transfer capacity and costs. The delta also makes it easier to save audit logs of the changes to the route in both systems or completely separate systems. We understand that sending a delta may need changes to the schema that is out of scope for this round of changes and requires more testing. At the same time, we feel that the benefits the functionality provides merits further consideration, at least in the next review cycle, and the changes required to support sending of deltas can be done in a way that they do not cause issues with backwards compatibility.

3. It would be beneficial from a VTS point of view to be able to send only new suggested schedules in response to a route plan the VTS has received from a ship without needing to send back the whole route as well as the new suggested schedule.
4. To better support route reference libraries and the sharing of route suggestions from the shore side (e.g. VTS) to ship, routeWaypointTurnRadius should not be mandatory in the S-421. The reason for this is that the turn radius is dependent on the vessel and it can not be defined at shore side. The technical reason for this change proposal is that a 0.0 turn radius does not hold the same value as an undefined turn radius. It should also be noted that having an empty element in the XML also does not hold the same meaning as an undefined value.
5. To be in line with the IMO Compendium and to better facilitate the sharing of routes underway it would be beneficial to add the ability to also convey actual times of arrival/departure at waypoints. The current S-421 supports three out of four of the types of arrival and departure times and is suitable to convey plans but starts to fail when a route that is being sailed is shared.
6. There are technical issues in the current XML schema that cause challenges and additional costs due to increased development time and complexity. We recommend streamlining the XML schema and resulting XML document structure to be more in line with XML design standards and to be better supported by existing software tools. Current tools do not have the ability to generate XML files according to the schema without significant development efforts. For example, the XML files provided as examples/test data with the current schema files fail validation.

5 ACTIONS REQUESTED

IEC TC80/WG17 is invited to:

1. note the response from VTS Committee to their previous liaison letter.
2. IEC TC80/WG17 is invited to review the VTS specific route exchange use cases for shore side and utilise them to develop respective use cases for the shipborne user perspective.
3. IEC TC80/WG17 is also invited to consider the identified problems and proposed changes to IEC 63173-1 and provide any feedback to the VTS Committee.
4. IEC TC80/WG17 is also invited to inform VTS Committee about the maintenance and update schedule of IEC 63173-1 data model (S-421)