MRP Mini Workshop

Maritime Requirements on 3GPP Rel-18 RAN Studies/Works Priorities

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Interactive session 1 on Inputs to 3GPP

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- List below your priority inputs to RAN:
  - ✓ NR Sidelink enhancements
  - ✓ NR Multicast and Broadcast
  - ✓ Non-terrestrial networks (satellite)

- Which of these have been taken up?
  - ✓ Three items listed above have been partly taken up though it needs additional enhancements because it is not yet to take into account the communication environement specific to the maritime domain where the radio channel characteristics at sea are not same as the ones on land.

- Which requirements are not covered that are still relevant?
  - ✓ Sidelink positioning is important to be supported bewteen vessels in order to get the more exact positioning information when any vessel accident happens at sea.
  - ✓ Features above need to be provided in randomly varying communication environments at sea.

Interactive session 2 on Mapping of Common Requirements

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Rank your priority requirements, where 1 is your top priority, 2 the next priority etc.

Topic		Priority Rank
Predictive QoS		5
Non public networks		8
Sidelink enhancements (including sidelink positioning)		1
IIoT and URLLC		7
NR multicast broadcast		6
Positioning enhancements		4
Scenarios for satellite usage		2
Other	Multi RAT Multi Connectivity	3

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Topic		Priority Rank
Sidelink enhancements (including sidelink positioning)		1
Scenarios for satellite usage		2
Other	Multi RAT Multi Connectivity	3

Explain your ranking (free text):

Sidelink enhancements, scenarios for satellite usage and multi RAT multi connectivity are important features required to enhance the communication coverage at sea where it is not possible to easily deploy the network infrastructures as it has done on land.

The sidelink enhancement including sidelink positioning is ranked as the 1st priority considering the availability of current maritime communication technologies at sea because it is assumed that more than 20 ~ 30 years will be taken to be migrated into the provision of the maritime communication over 5G and beyond.

✓ There is the solution to provide the direct communication between vessels without the network infrastructure but with the very limited service and low performance at sea. In order to support emerging requirements from upcoming new businesses at sea, the revolutionary enhancement of the existing direct communication between vessels is inevitably requested. In addition, it is very critical to have positioning of vessels and people on board requested to be rescued when any accident happens during the navigation at sea regardless of whether there is any network infrastructure around vessels or not. Therefore, sidelink enhancements including sidelink positioning is ranked as 1st priority. The currently ongoing 3GPP works on NR slidelink enhancements need to be continuously enhanced to provide more optimized performance to maritime communication environments where much longer distance needs to be supported, earth curvature also needs to be considered and other potential impacts from antenna heights and the sea surface wave along with vessel movement need to be analyzed.

✓ Satellite access is the essential feature required to support broad coverage at sea. It was ranked as 2nd priority because of the following reasons.

- The solutions based on the legacy satellite access technologies are also expected to be enhanced to provide better performance required for the emergence of new businesses at sea such as autonomous ships or oceanic farming at sea.

- Therefore, the alternative solutions based on the enhancement of legacy satellites are assumed to be available for the time being until satellite solutions are migrated to what 3GPP are to be standardized for satellite access over 5G and beyond.

✓ Assuming the ship's life (i.e. 20 ~ 30 years on average), legacy maritime communication technologies will co-exist with upcoming new maritime communication technologies over 5G and beyond so it is required to support the multi RAT and multi connectivity ranked as 3rd priority considering the communication between legacy type of vessels and new type of vessels such as autonomous ships.

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Topic	Priority Rank
Positioning enhancements	4
Predictive QoS	5
NR multicast broadcast	6
IIoT and URLLC	7
Non public networks	8

Explain your ranking (free text):

Positioning enhancements is ranked as 4th priority because the positioning is an essentially required feature next after the coverage expansion at sea.

Predictive QoS is ranked as 5th priority because of few network infrastructures at sea and potential communication disruption from sea weather such as unavailability of satellite access etc. If it is possible to inform an autonomous ship of whether radio link is disconnected in near future, autonomous ships can prepare for other navigation mode in avance before the unavailability of external communication methods connecting to things or users on land occurs.

NR multicast broadcast is ranked as 6th priority because multicast and broadcast communication is one of efficient communication technologies to enable a vessel to communicate with other vessels around that vessel under the restriction of the network infrastructure at sea.

IIoT and URLLC is ranked as 7th priority and non public networks is ranked as 8th priority because both features are expected to be applicable to the communication among IoT devices inside a vessel whose size is more than a few hundreds meters.

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