

Claims

1. Antenna array module for a communication system on a cargo ship, comprising at least a first (11),
a second (12) and a third (16) antenna element, each containing an antenna feed, whereby said first
5 (11) and said second (12) antenna element are arranged to radiate mainly towards a first path and
said third (16) antenna element is arranged to radiate mainly towards a second path opposite to said
first path and whereby said first antenna element is tilted with respect to said second antenna
element.
- 10 2. Antenna array module as in claim 1, whereby at least one of said antenna elements is a patch
antenna.
3. Antenna array module as in claim 1 or 2, whereby said first and said second antenna element are
tilted with respect to one another over an angle in the range of 5° to 70°.
4. Antenna array module as in any of the previous claims, wherein at least one of said antenna
15 elements is arranged for radiating with circular polarization.
5. Antenna array module as in claim 4, wherein said at least one antenna element is provided with
perturbations to excite two orthogonal radiation modes.
6. Antenna array module as in any of the previous claims, wherein said antenna elements are
arranged on a substrate of dielectric material.
- 20 7. Antenna array module as in any of the previous claims, comprising a power divider/combiner
arranged to split a signal to be transmitted over said at least three antenna elements and to combine
signals received from the at least three antenna elements.
8. Antenna array module as in any of the previous claims, wherein said first antenna element, when
installed, is tilted with respect to a vertical plane wherein said second antenna element is positioned
25 to improve directivity in vertical direction.
9. Antenna array module as in any of the previous claims, wherein said at least three antenna
elements form a substantially vertical stack.
10. Antenna array module as in any of the previous claims, wherein said antenna elements are made
in a printed technology.
- 30 11. Antenna array module as in any of the previous claims, comprising a housing for said antenna
elements.
12. Antenna array module as in any of the previous claims, wherein said third antenna element is not
tilted with respect to said second antenna element.
13. Method for installing an antenna array module on a cargo ship, the method comprising :

- taking an antenna array module as in any of the previous claims,
- mounting said antenna array module on the bridge of said cargo ship, said bridge being so positioned to divide said cargo ship along its length axis in a longer part and a shorter part, whereby said first (11) antenna element is tilted with respect to said second (12) antenna element said first
5 and said second antenna element are so positioned that the main lobe of their directive pattern points towards a first path corresponding to said longer part, and said third (16) antenna element is positioned to radiate mainly towards a second path opposite to said first path.

14. Method for installing as in claim 13, whereby a plurality of said antenna array modules are mounted on said bridge.

10 15. Method for installing as in claim 13 or 14, whereby said antenna array module is mounted on a side of said bridge where a direct line of sight towards said longer part is available.