 Input paper: [[1]](#footnote-1) ENG3-9.7.1

Input paper for the following Committee(s): check as appropriate Purpose of paper:

**□** ARM • ENG **□** PAP • Input

**□** ENAV **□** VTS **□** Information

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Technical Domain / Task Number 2 TD#1 - Light and vision physics, Visual Signalling

Task number 32 (1.1.3)

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AtoN-on-Demand

# Summary

This paper provides information on the AtoN-on-Demand (AoD) concept, describing an AtoN light that enables remote activation of the navigational light signal upon demand – at the time when it is needed by the mariner, using established communication technologies. An implementation example of network centric AoD control is provided in ([2]).

## Purpose of the document

This document is submitted to the IALA ENG Committee as a response to the ENG2 action item 32. The information on AoD is intended for inclusion in the revised edition of the IALA Guideline 1038 on Ambient Light Levels at which Aids to Navigation Lights should switch on and off ([1]) that is subject to review and updating in the ENG Committee, to be released under a new title: IALA Guideline 1038 on Levels and Methods for the Activation and Control of AtoN Lights.

## Related documents

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# Background

At locations where operating an AtoN light in continuous manner is not substantiated by low regular marine traffic densities and/or limited availability of power, the whole AtoN can be deployed in a way enabling activation on demand at the times when the need in navigational signal arises.

AtoN lights are typically deployed with luminous intensities selected in a way that provides dependable navigational signalling within a reasonable percentage of the typical range of environmental conditions dominating at the location. Implementation of additional remotely activated occasional lights with significantly higher luminous intensity, or foreseeing such high intensity modes within a single light unit, helps to lower navigational risks at locations where decreased visibility caused by fog or heavy rain can persist for significant time periods.

Benefits of implementing an AoD include improved navigational safety, power savings, extending of the usable life time of the light source, and reducing of light pollution in the environment.

# Discussion

## AtoN-on-Demand (AoD)

AtoN-on-Demand (AoD) is a an AtoN light equipped with a subsystem that enables remote activation of the navigational light signal based on the needs of the mariners instead of the regular, light sensor based day to night transition or pre-programmed operational schedules. To work in the e-Navigation infrastructure, an AoD must be equipped with remote control equipment that corresponds to the activation method and is compatible with selected communication protocols.

Implementation of an AoD is practical at locations where use of occasional lights is substantiated due to limited traffic densities and restricted availability (high cost) of energy. AoD can also be implemented as a complementary solution to enable increasing of luminous intensity of regular AtoN lights in severe weather conditions like fog or heavy rain, with several luminous intensity levels foreseen where feasible.

When deployment of an AoD is considered and general navigational risk assessment allows it, decisions regarding the following aspects must be made:

1. Intended group of users – all mariners, limited groups of mariners or vessels (local ferries), all vessels carrying AIS, etc.
2. Activation method – direct (requested by a mariner), or indirect (automated, based on AIS traffic data or other relevant information available over the communications network).
3. Selection of activation technology suitable for targeted user groups and selected methods.

## AoD activation methods

Activation method to be selected for control of AoD depends on targeted group of users and foreseen access limitations. Risks associated with the vulnerabilities and availability must be considered before choosing to deploy an AoD. It should also be decided whether the AtoN light signal stays on until deactivated, or shuts down after a pre-set time period. Unless the user group is limited to known maritime professionals only, the latter is recommended. Even when no harm can typically result from unsubstantiated AoD activation, selection of activation methods that allow to avoid draining of power are recommended.

### Technologies available for direct AoD activation

#### Multiple VHF squelch detection

Certain AoD implementations are known to utilise counting of multiple successive activation instances of the “Transmit” (PTT) button on an agreed-upon marine VHF radio channel for activation of the AtoN light for a pre-configured time period.

This technology is suitable for unlimited user group but does not provide any means for user authentication as well as no feedback information on state of the light.

#### Cellular Short Message Service (SMS)

Certain AoD implementations are known to utilise Short Message Service (SMS) messages of the cellular GSM phone system for activation of the AtoN light for a pre-configured time period.

This technology is suitable for unlimited user group as well as limited groups of “whitelisted” phone numbers. It does provide basic means for user authentication and even feedback information, but cannot be considered 100% reliable: while up to 5% of all SMS messages may be lost in transmission or significantly delayed, sender’s GSM phone number can also be spoofed.

#### World Wide Web based client / server solutions

Certain AoD implementations are known to utilise Internet solutions based on dedicated WWW servers and standard web browsers for activation and deactivation of the AtoN light.

This technology is suitable for unlimited user group as well as limited groups with access based on user names and passwords. Due to global access potential, unlimited anonymous public access is not recommended. It provides wide range of means for user authentication, provision of feedback information, posting warnings to responsible organisation and logging of all related events at server side. Since users have no direct access to the AtoN, such systems provide higher degree of protection against unauthorized activations and remote system disruptions.

#### Internet based application / server solutions

AoD implementations can utilise dedicated client side application software and dedicated servers for activation and deactivation of the AtoN light. While otherwise similar to solutions utilising WWW technology, dedicated “apps” are used on the client side instead of standard web browsers.

#### Other technologies

Other existing and future information and communication technologies may be feasible for AoD implementation. Relevant risks, reliability and benefits must be analysed case by case before AoD deployment.

### Technologies available for indirect AoD activation

#### Automated activation based on monitoring of AIS broadcasts for course and proximity

#### Automated activation based on information from VTS (course and proximity)

#### Other e-Navigation technologies available in the future

# References

1. IALA Guideline 1038 on Ambient Light Levels at which Aids to Navigation Lights should switch on and off. Edition 2, May 2009.
2. Aid to Navigation on Demand Fog Lights. Presentation at IALA EEP21 by Aivar Usk (Cybernetica AS) – October 2013

# Action requested of the Committee

The Committee is requested to:

1. Review the input paper and use the contents for updating Guideline 1038 as far as considered appropriate.

1. Input document number, to be assigned by the Committee Secretary [↑](#footnote-ref-1)
2. [↑](#footnote-ref-2)