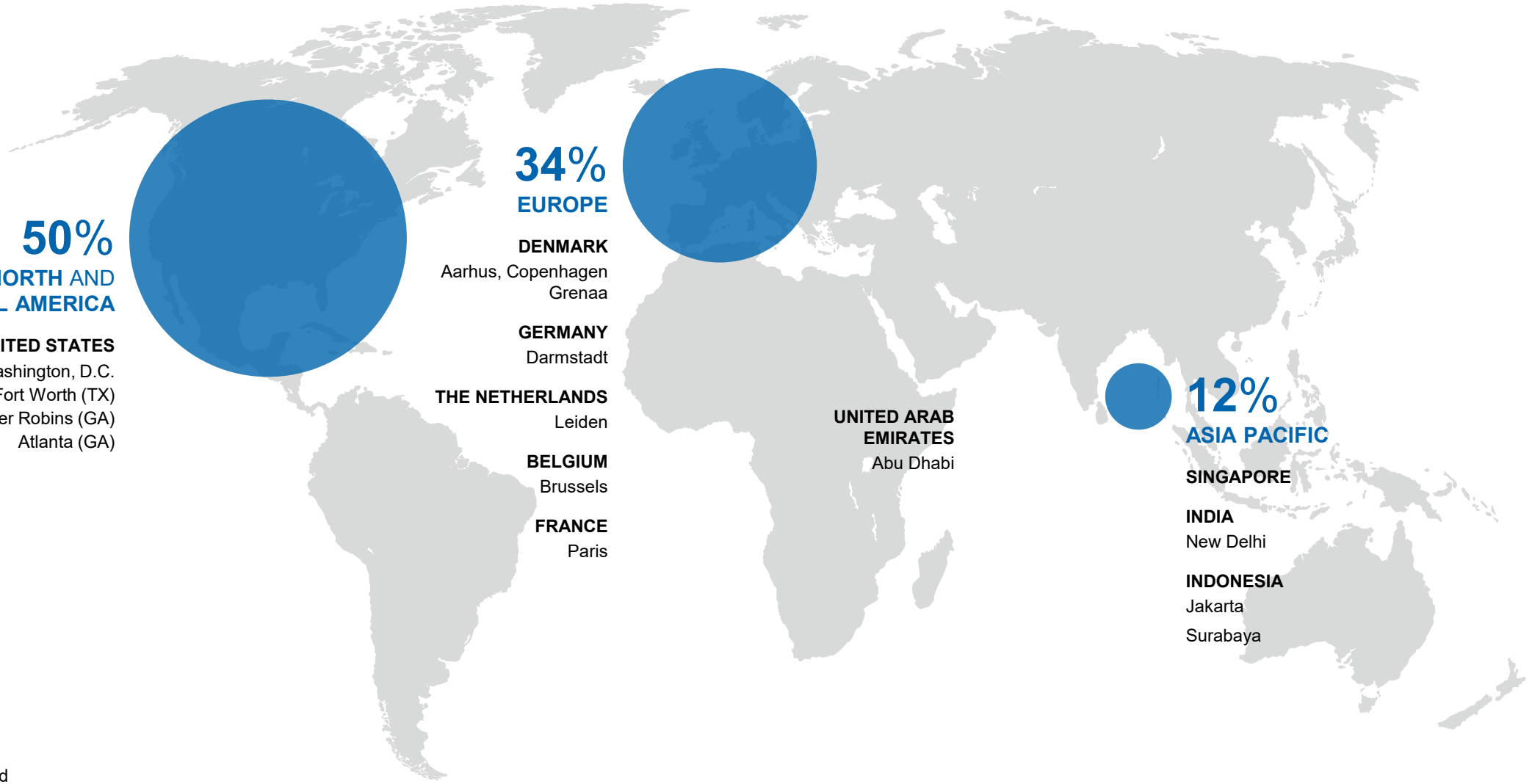
INTRODUCTION TO ADLS

27 OCTOBER 2022

Contents

Terma is a Global Company…

4%
REST OF THE WORLD



50%
NORTH AND CENTRAL AMERICA

UNITED STATES
Washington, D.C.
Fort Worth (TX)
Warner Robins (GA)
Atlanta (GA)

34%
EUROPE

DENMARK
Aarhus, Copenhagen
Grenaa

GERMANY
Darmstadt

THE NETHERLANDS
Leiden

BELGIUM
Brussels

FRANCE
Paris

UNITED ARAB EMIRATES
Abu Dhabi

12%
ASIA PACIFIC

SINGAPORE

INDIA
New Delhi

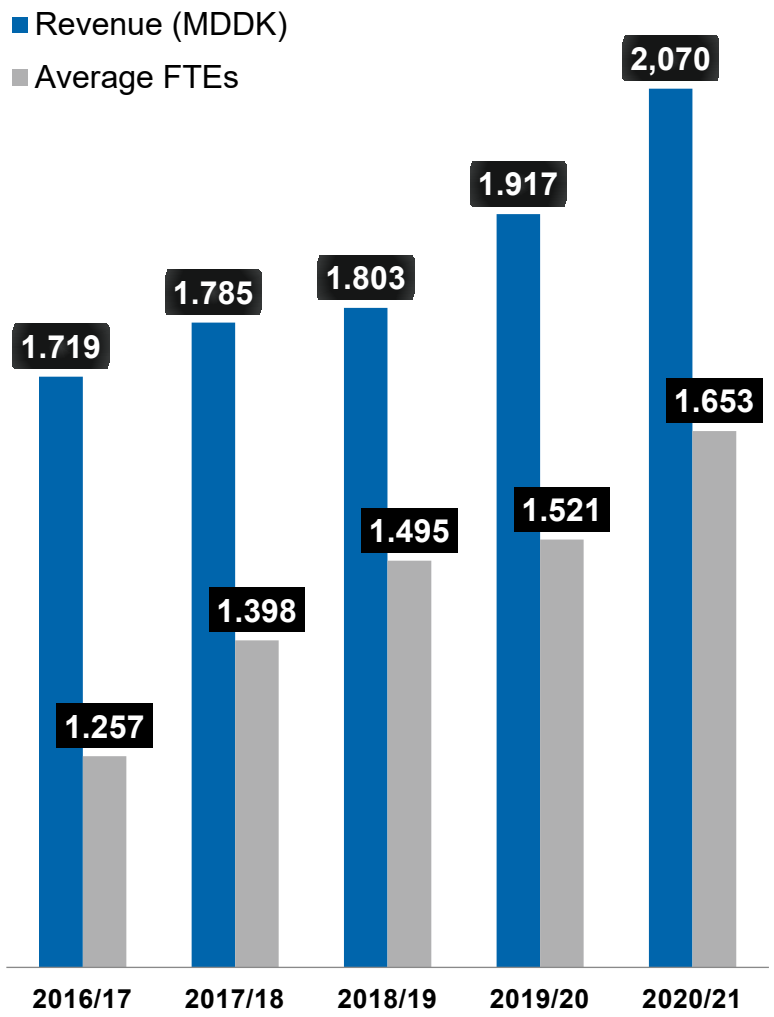
INDONESIA
Jakarta
Surabaya

% REVENUE
worldwide / invoiced

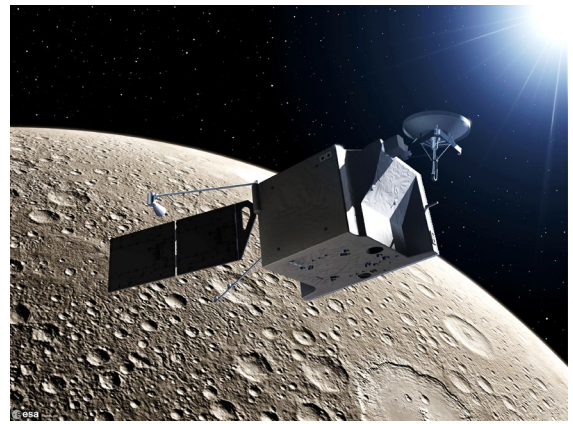
… with Strong Danish Roots

Terma was founded in 1949 in Aarhus, Denmark

It is a privately-held company, owned by the Danish Thomas B. Thrige Foundation



Our Markets



LAND

SEA

AIR

SPACE

Surveillance & Mission Systems

Aeronautics

Space

Terma Support & Services

SURVEILLANCE & MISSION SYSTEMS (SMS)

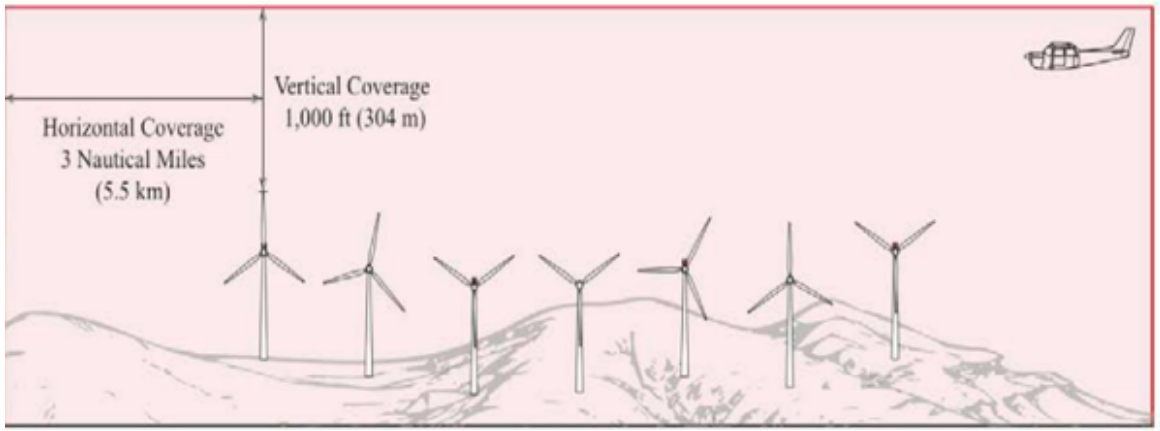
3,000+ RADARS DEPLOYED WORLD-WIDE FOR:

- Coastal Surveillance & Border Security
- Vessel Traffic Service (VTS)
- Surface Movement Radars (SMR) at Airports
- Critical Infrastructure Protection (CIP)
- Naval Surface Surveillance & Helicopter Control
- Wind Farm Solutions (ADLS, WTRIM, drones, birds, etc.)

FAA Regulatory requirements stipulated by the AC/70-460-1M

Horizontal detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the perimeter of the volume, which is a minimum of 3NM (5.5 km) away from the obstruction or the perimeter of a group of obstructions.

Vertical detection coverage should provide for obstruction lighting to be activated and illuminated prior to aircraft penetrating the volume, which extends from the ground up to 1.000 feet (304 m) above ground, for all areas within the 3NM perimeter.



* System above shown in active mode with aircraft in coverage area

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Obstruction Marking and Lighting **Date:** 12/04/15 **AC No:** 70/7460-1L
Initiated By: AJV-15

1. **Purpose.**
This Advisory Circular (AC) sets forth standards for marking and lighting obstructions that have been deemed to be a hazard to navigable airspace.

2. Advisory Circular 70/7460-1L is effective immediately. However, flashing L-810 lighting has a delayed effective date and becomes mandatory on September 15, 2016.

3. **Cancellation.**
Advisory Circular 70/7460-1K, Obstruction Lighting and Marking, dated February 1, 2007, is cancelled.

4. **Principal Changes.**
The principal changes in this AC are:

   1. The height of a structure identified as an obstruction has been lowered from 500 feet above ground level (AGL) to 499 feet above ground level, by amendment to Title 14 Code of Federal Regulations (14 CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace* (75 Federal Register 42303, July 21, 2010). Accordingly, all structures that are above 499 feet AGL are considered obstructions and the Federal Aviation Administration (FAA) will study them to determine their effect on the navigable airspace. This will ensure that all usable airspace at and above 500 feet AGL is addressed during an aeronautical study and that this airspace is protected from obstructions that may create a hazard to air navigation.

   2. Standards for voluntary marking of meteorological evaluation towers (METs), less than 200 feet above ground level (AGL), has been added to provide recommendations towards increasing conspicuity of these structures, particularly

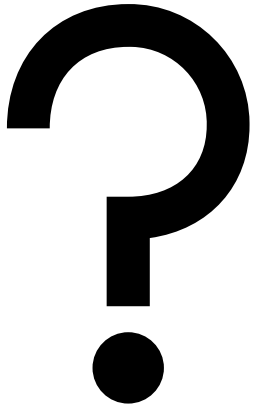
Technologies Considered (to date)

Aircraft Detection Lighting Systems (ADLS) are *sensor-based systems* designed to detect aircraft…

Shielding
Wasn't successful or approved by FAA.

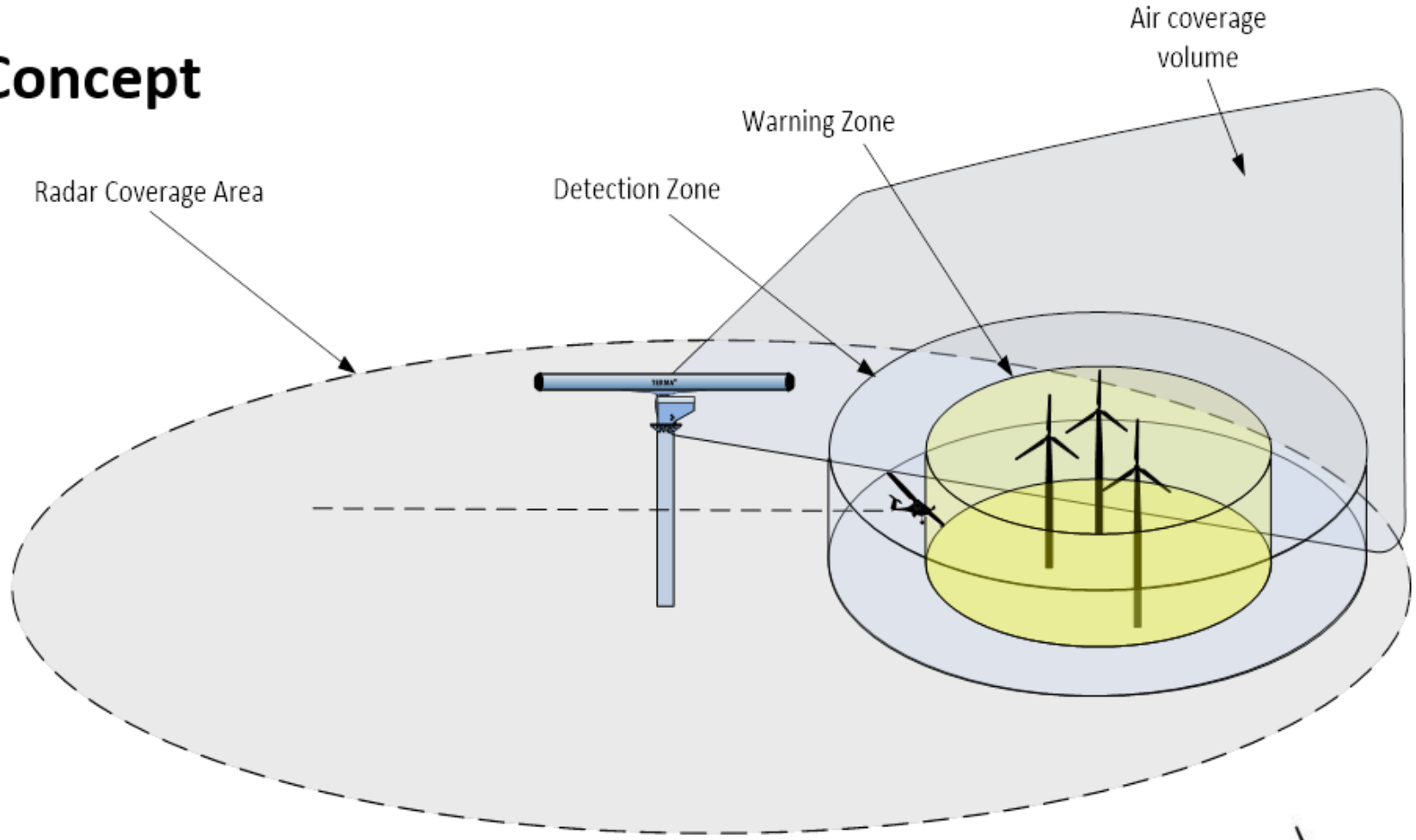
Dimming
Function of lighting mfg.

Radar
Only effective ADLS sensor that has been tested & approved by the FAA.



Radar Controlled Lighting

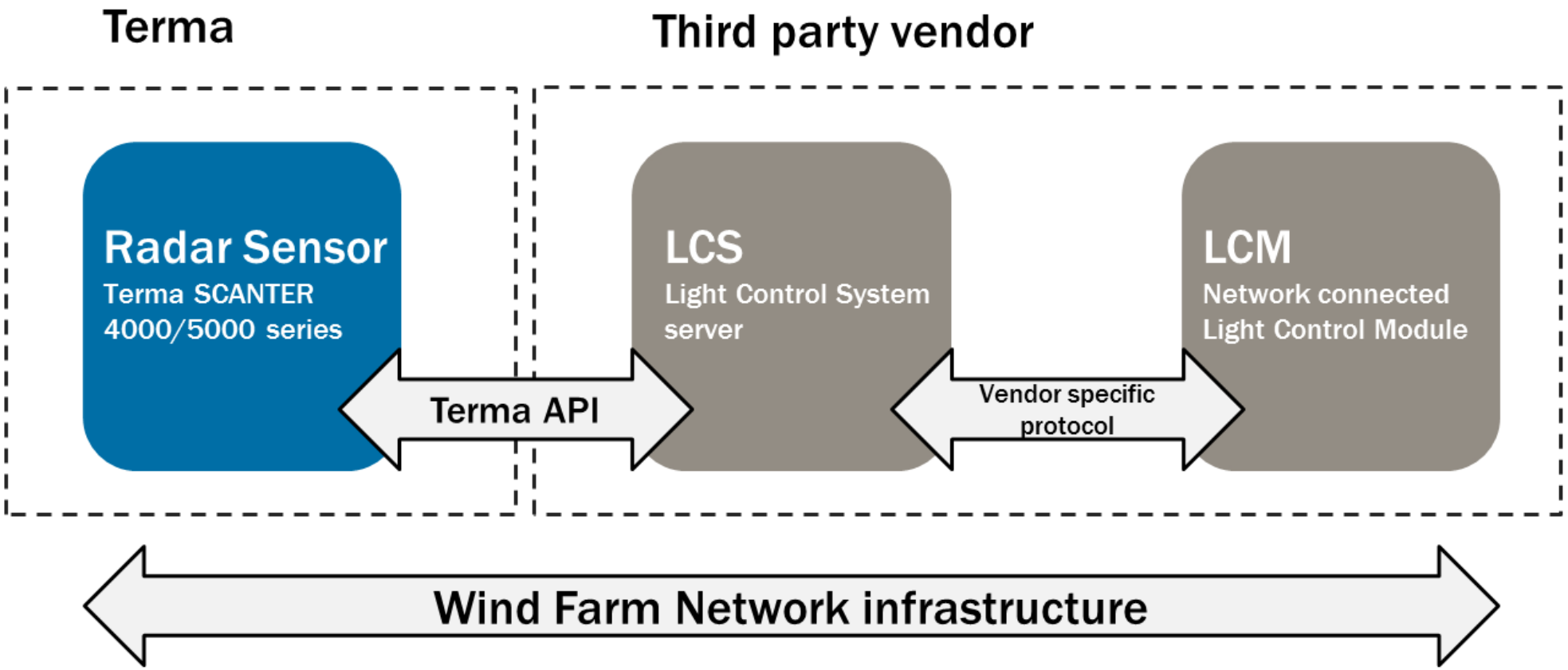
Zone Concept



Warning Zone = Light On/off

Detection Zone = Is it an Air Vehicle ?

Simple System Architecture

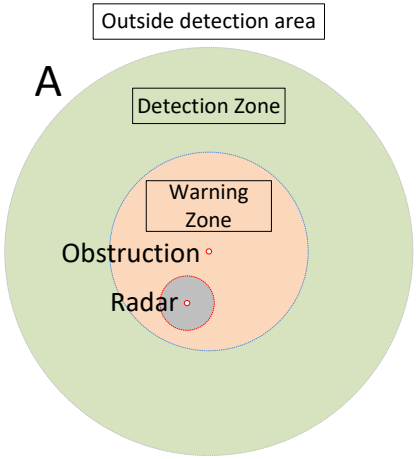


Simple Deployment

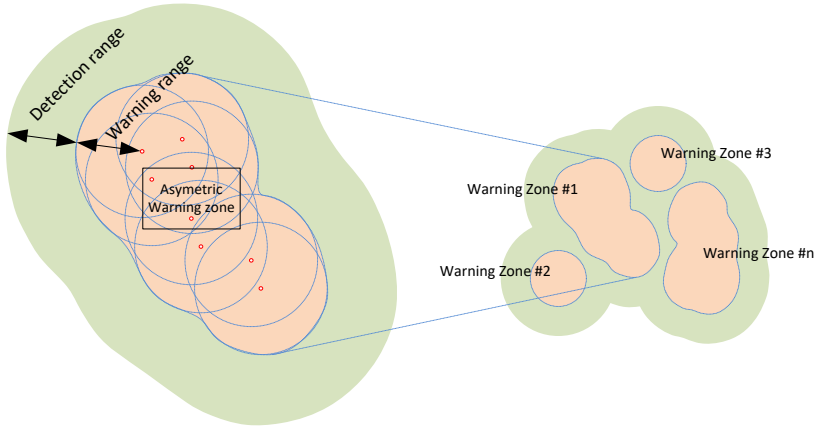
My favorite ADLS picture!

Highly Configurable

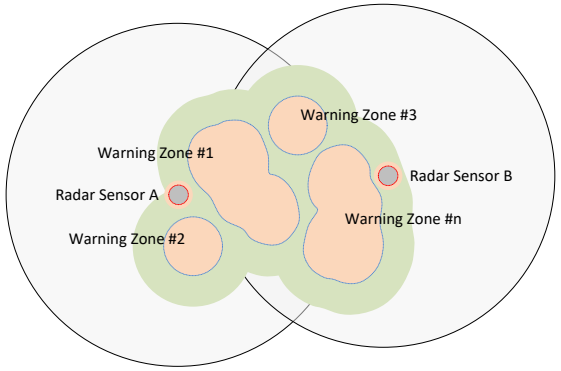
From a single radar sensor w/one zone…to



A single radar with individual zones defined within same wind farm (i.e., ability to enable lights in one zone at a time vice the whole wind farm)…to



Multiple radar sensors with asymmetric zone layout and fused data presentation



ADLS Vendors

- Laufer Wind (2016) – First to market, first to install, and first to go out of business. ☺

- Terma (2016)
  - Manufacturing, deploying & maintaining radar systems since 1946.
  - 3000+ radars installed world-wide…the same radars that are being used in ADLS & other wind applications.
  - Dozens of ADLS systems installed across Europe and in North America.
  - We ARE the manufacturer of the radar AND the developer of the ADLS (no supply chain/obsolescence issues).

- DeTect (2017)
  - System integrator using a Kelvin Hughes (U.K.-based) radar for their ADLS.

- Vestas (2017/18)
  - Turbine manufacturer that attempted to develop their own ADLS (Intelilight) using Japanese-based JRC radar.

- C-Speed (pending FAA testing & approval)
  - System integrator using a Kelvin Hughes (U.K.-based) radar for their ADLS.

Why Purchase & Install an ADLS?

1. Good, proactive community partner;
2. Eliminate one of the objections to wind farm development;
3. Mandatory Federal Agency requirements (i.e., BOEM);
4. Mandatory State requirements (at least 7);
5. Local/county/municipal requirements (new & re-powers);

Final Thoughts:

- ADLS is a mature, proven technology (with little risk);
- Adequate & growing # ADLS vendors (technology choices);
- Competitive pricing (again, choices);
- Effective tool for mitigating the objections to WF dev'p;

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