ONSHORE AIRCRAFT DETECTION LIGHTING SYSTEM (ADLS)

SCANTER RADARS

Keeping the skies around a wind farm safe and dark

– only turning the aviation obstruction lights on when necessary

The urgent need for power production to meet the growing demand for energy across the world is driving the search for clean and sustainable sources of power that can be generated with minimal pollution and in large volumes. Wind energy is currently the most developed and cost-efficient renewable energy source for producing clean power. As a result, there has been a significant increase in the number of wind turbines installed worldwide, with the goal of improving their efficiency and generating more power.

However, the increasing number of wind turbines has raised concerns about their impact on the environment, particularly in the lower airspace, which is used by smaller aircraft. To ensure the safety of pilots and prevent collisions, aviation obstruction lights are necessary. But the increasing number of high intensity flashing lights on wind turbines has resulted in another form of pollution – light pollution.

Light pollution has become a major concern to the public, as it contributes to the deterioration of the natural environment. It has also led to a decrease in public support for the construction of wind farms, which could result in delays in the permitting process and a reduction in the number of new leases granted in the future. Addressing the issue of light pollution is therefore crucial for ensuring the long-term viability of wind energy as a clean and sustainable source of power.

The Terma Aircraft Detection Lighting System (ADLS) provides a technical solution to the problem of light pollution caused by wind turbines. It also helps to increase public acceptance of wind farm projects, making them a true enabler for clean power production. The Terma ADLS solution is already in operation in dozens of wind farms globally and offers several key benefits:

- **Up to 18 nautical miles range** with 360° coverage
- **Only ADLS provider utilizing full inter-turbine radar visibility providing continuous tracking of aircrafts in the airspace over and around the WF and in between WTGs providing the best and safest performance possible**
- One radar solution or multiple radars with fused data.
- Aviation light and Wind Turbine Generators (WTG) independent solution – integration to most common aviation lights.
- Proven performance from dozens of installed ADLS solutions globally
- **Ability for full remote monitoring and SCADA system integration**

The Terma ADLS solution is based on best-in-class radar systems, with a built-in tracker enhanced with AI. This provides a full 360° coverage around and inside a wind farm, with tracking of both non-cooperative and cooperative aircraft. The ADLS solution is applicable for onshore and offshore wind farms, ensuring safe and efficient operation.

Terma has designed, developed, and deployed radars for more than 70 years and have 3500+ systems in operation worldwide. This experience results in a high-performing ADLS with excellent tracking capabilities that provides the best and safest ADLS performance on the market – both onshore and offshore.

Terma owns and operates its own manufacturing facilities. This is to minimize span of control and provide safe and secure products and solutions which complies to required security and quality standards.

Compliance and regulations

The increasing size of wind turbines is creating safety and societal challenges for the wind industry, the authorities, and the surrounding municipalities when it comes to complying with air traffic regulations.

Terma have been in close collaboration with all the responsible authorities to provide guidance and support for shaping and interpreting the regulations. Terma has experience with radar coverage and have offered our experience to the regulating authorities to ensure a smooth approval process for an ADLS. The Terma ADLS solution is compliant with the applicable regulations for an Aircraft Detection Lighting System and have been approved by the regulating authorities in these countries:

- United States of America
- Canada
- Germany
- The Netherlands
- Denmark

Solution Capabilities

Drawing from our extensive operational experience with dozens of Terma ADLS installations, we have achieved exceptional success in seamlessly integrating with a diverse range of SCADA systems and network configurations. As such, the Terma ADLS is highly compatible with a wide range of wind turbine and lighting vendors.

The Terma ADLS boasts an adaptable design that can be installed either up-mast or down-mast, with an A/C controlled enclosure engineered for deployment in varying climate conditions, including both cold and warm environments. This design feature affords significant flexibility in the ultimate placement and installation of the Terma ADLS

Monitoring and Network Cyber security

The Terma ADLS is equipped with an OPC UA server that facilitates seamless integration into the customer's SCADA system. This enables streamlined management of wind farm operations by providing a comprehensive overview of the status of ADLS and lighting systems. Additionally, the ADLS OPC UA server boasts a diverse array of data tags, allowing for customized monitoring capabilities within the SCADA system.

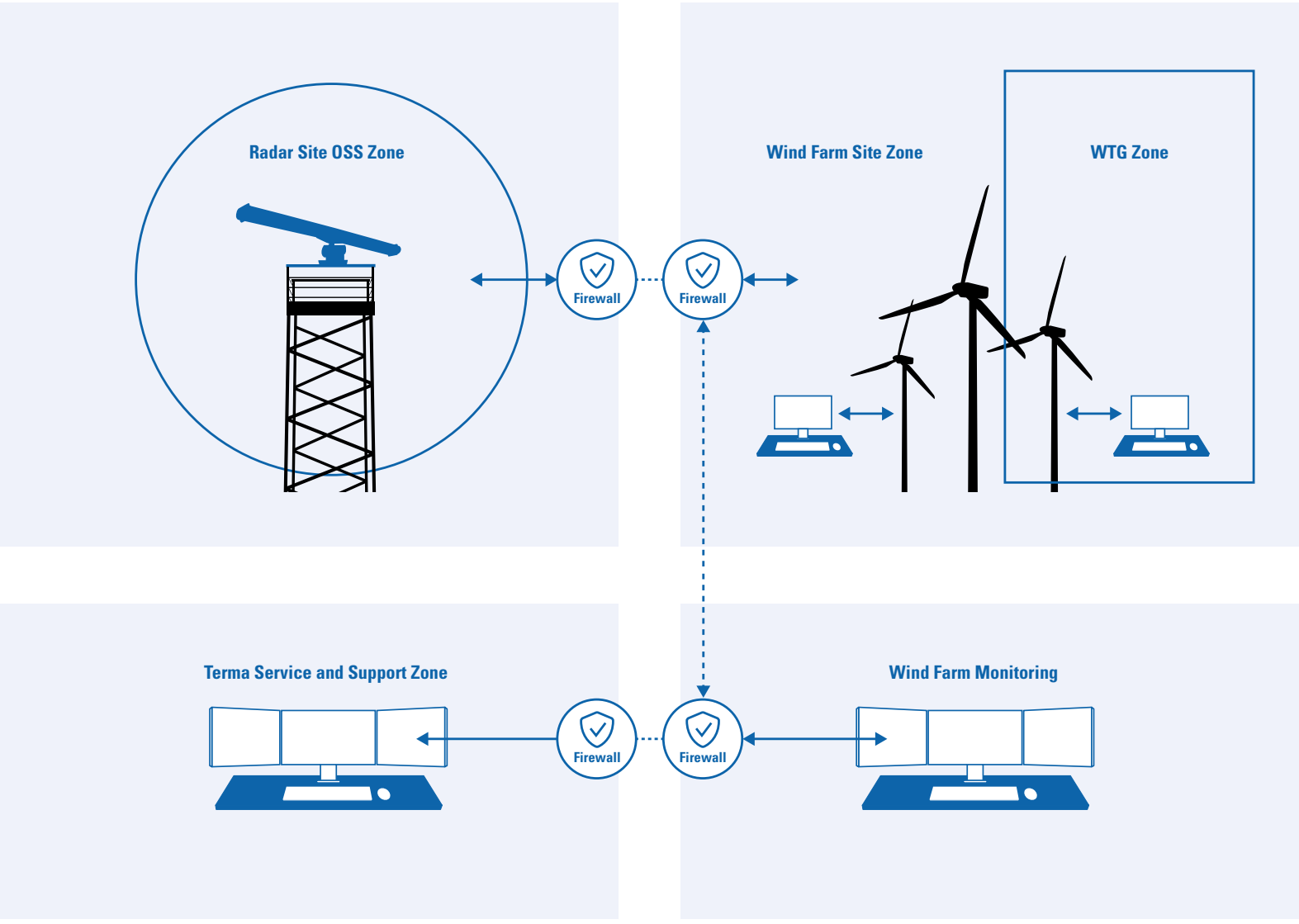
Cyber security

Terma has a strong background in defense and security industries, with extensive experience in critical systems and infrastructure. This includes expertise in integrating cybersecurity and hardening solutions into critical systems. Wind farms are critical infrastructure and require strong defenses against cyber threats. Terma is committed to providing its customers with the best solutions and support to ensure a robust and resilient system.

Ensuring the continuous operation of the Terma ADLS is crucial, and to support this, Terma offers a wide range of services. One such service is patch management, which ensures that the ADLS system remains updated and maintains its cybersecurity level while preserving functionality and system performance.

Terma provides cybersecurity services at both the product/system level and enterprise level. The following standards constitutes the framework and structure that is part of the Terma cyber security initiatives:

- ISO 27000 Framework, specifically 27005 for risk assessment
- IEC 62443 with the underlying sub-standards
- NERC CIP 002-014
- US DoD – CMMC 2.0 level 2
- NIST SP800-171
- ISO 9001/EN-9100 and AQAP-2210 for IT development activities



Product Characteristics

Terma's SCANTER radars employ fully digital signal processing and Solid-State technology, which provides high-quality radar images with low false alarm rates. The SCANTER radars are capable of tracking non-cooperative targets like small aircraft, ultralights, and birds in any weather condition, thereby ensuring that obstruction lights are activated only when required.

Scalability and Cost-Effectiveness

The ADLS is scalable and can be positioned flexibly to address multiple wind farms using a single radar, which reduces the overall cost and provides scalability to accommodate future wind farm expansion.

Product Sustainment

Terma's SCANTER radar family has demonstrated its performance, reliability, and sustainability in security applications worldwide. The SCANTER radars use Terma's advanced hardware and software technology to provide a proven platform that ensures high availability (High Meantime Between Failure).

Service and Maintenance

Terma understands the importance of maintaining optimal system availability with minimal maintenance. To achieve this, Terma provides a comprehensive range of services that support customers throughout the entire lifetime of their wind farm and ADLS system, including measures to enhance OT security and ensure compliance with high cyber security standards.

The Terma Lifecare package offers services that enable uninterrupted operation of the ADLS system and minimize downtime. The package comprises an effective infrastructure for services and maintenance, with Support, Preventive Maintenance, Corrective Maintenance, and Spare Parts Supply as key areas of focus.

Terma Lifecare can be customized to suit the specific requirements of individual customers, leveraging the broad range of services offered by Terma.

Operating in the aerospace, defense, and security sector, Terma supports customers and partners all over the world. With more than 1,600 committed employees globally, we develop and manufacture mission-critical products and solutions that meet rigorous customer requirements.

At Terma, we believe in the premise that creating customer value is not just about strong engineering and manufacturing skills. It is also about being able to apply these skills in the context of our customers' specific needs. Only through close collaboration and dialog can we deliver a level of partnership and integration unmatched in the industry.

Our business activities, products, and systems include: command and control systems; radar systems; self-protection systems for ships and aircraft; space technology; and advanced aerostructures for the aircraft industry.

Terma has decades of hands-on know-how in supporting and maintaining mission-critical systems in some of the world's most hostile areas. Terma Support & Services offers through-life support of all our products to maximize operational availability, enhance platform lifetime, and ensure the best possible cost of ownership.

Headquartered in Aarhus, Denmark, Terma has subsidiaries and operations across Europe, in the Middle East, in Asia Pacific as well as a wholly-owned U.S. subsidiary, Terma Inc., with offices in Washington D.C., Georgia and Texas.

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