



# **AIRCRAFT DETECTION LIGHTING SYSTEMS**

## **ADLS**

Presented by: DeTect, Inc  
Gary W. Andrews, President & CEO

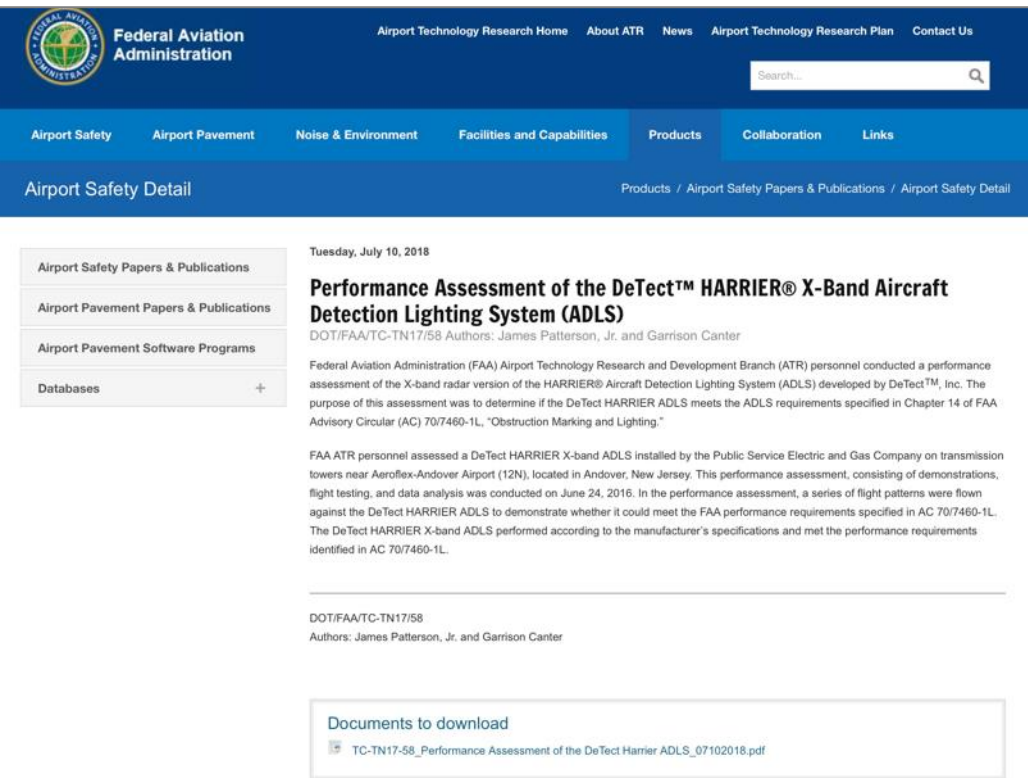
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# What is an ADLS?

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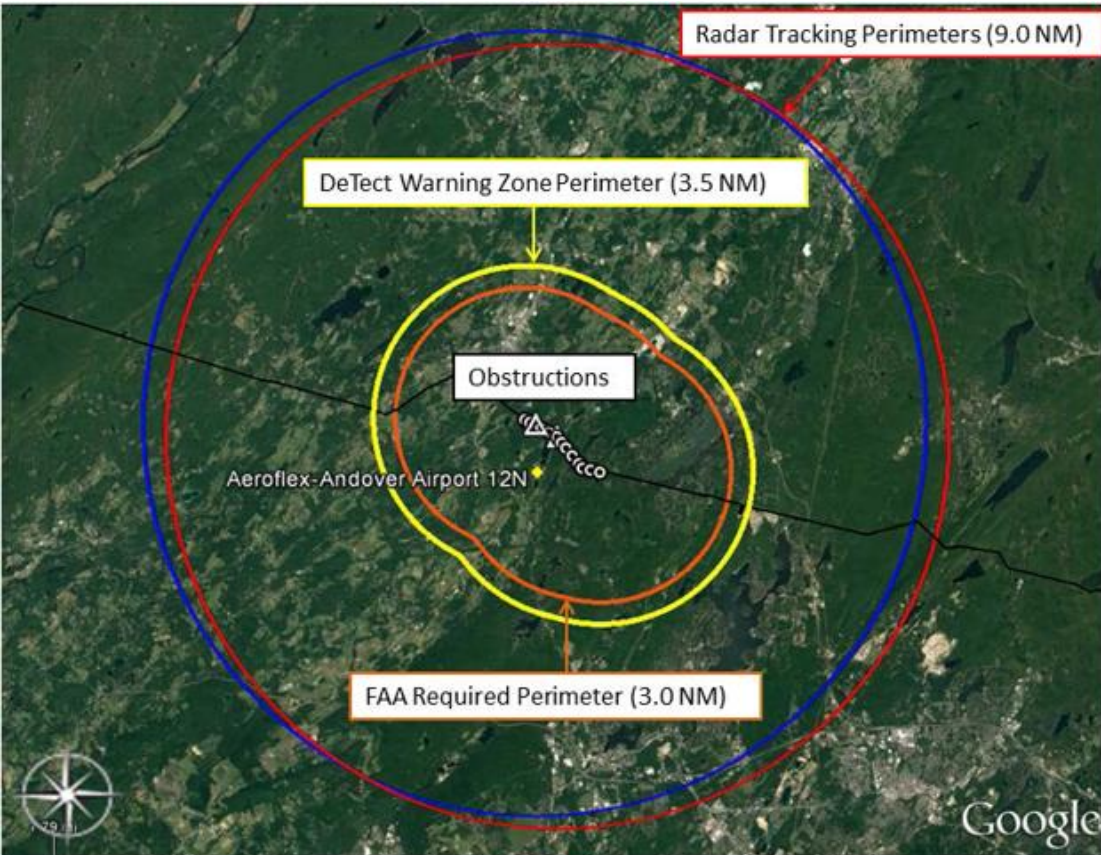
- An **Aircraft Detection Lighting System** (ADLS) is a sensor-based system that monitors the airspace around a site, detecting aircraft & activating obstruction lights only when aircraft are within a specified distance
  - ADLS in the US use radar as the main sensor
  - The first US ADLS was installed in 2009
- The push for ADLS started with the **Dark Skies movement** in the 1950's by astronomers concerned that nocturnal skyglow from urban areas was blotting out stars
  - 'Light pollution' also can affect animals, especially migrating birds
  - The International Dark-Sky Association (IDA) formed in 1988 to reduce 'inappropriate or excessive use of artificial light'
- Wind farms located in remote areas became a focus in the 2000's



The screenshot shows the Federal Aviation Administration (FAA) website. The main navigation bar includes "Airport Safety", "Airport Pavement", "Noise & Environment", "Facilities and Capabilities", "Products", "Collaboration", and "Links". The "Products" section is active, and the page title is "Airport Safety Detail". The main content area displays a document titled "Performance Assessment of the DeTect™ HARRIER® X-Band Aircraft Detection Lighting System (ADLS)" dated Tuesday, July 10, 2018. The document is authored by James Patterson, Jr. and Garrison Canter. The text of the document states that FAA personnel conducted a performance assessment of the X-band radar version of the HARRIER® Aircraft Detection Lighting System (ADLS) developed by DeTect™, Inc. The purpose was to determine if the DeTect HARRIER ADLS meets the ADLS requirements specified in Chapter 14 of FAA Advisory Circular (AC) 70/7460-1L, "Obstruction Marking and Lighting." The document also mentions that FAA ATR personnel assessed a DeTect HARRIER X-band ADLS installed by the Public Service Electric and Gas Company on transmission towers near Aeroflex-Andover Airport (12N), located in Andover, New Jersey. The performance assessment, consisting of demonstrations, flight testing, and data analysis, was conducted on June 24, 2016. The DeTect HARRIER X-band ADLS performed according to the manufacturer's specifications and met the performance requirements identified in AC 70/7460-1L.

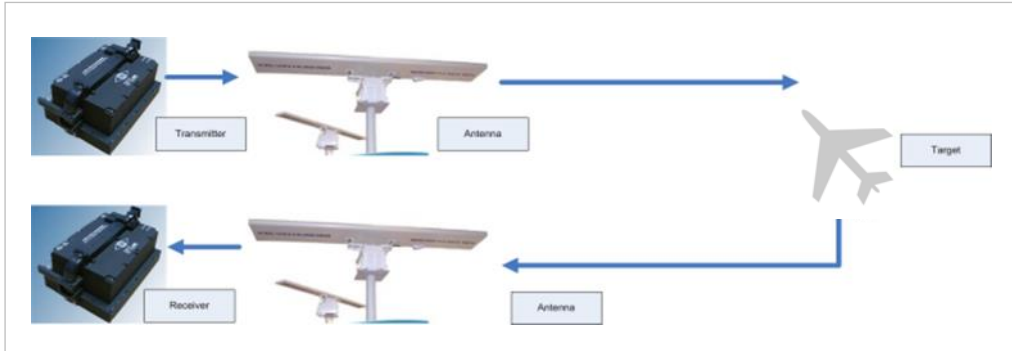
\* <https://www.airporttech.tc.faa.gov/Products/Airport-Safety-Papers-Publications/Airport-Safety-Detail/ArtMID/3682/ArticleID/164/Performance-Assessment-of-the-DeTectTM-HARRIER174-X-Band-Aircraft-Detection-Lighting-System-ADLS>

- The FAA began assessing the technology in 2011
  - Issued Advisory Circular 70/7460-1M as Chapter 14, "Aircraft Detection Lighting Systems" (2015)
  - Canada, Australia, and Germany have issued similar standards
- States & local jurisdictions are now passing regulations requiring ADLS, especially rural areas
  - North Dakota was the first state to mandate ADLS for new & existing wind farms
  - Other states are now working on similar regulations; many counties also now require ADLS
- To be used, an ADLS must be evaluated & tested by the FAA
  - If acceptable, the FAA issues a TechNote to the manufacturer\*
  - Currently there are 3 main ADLS manufacturers with about 100 systems installed & operating in the US:
    - DeTect (US company), Terma (Denmark) & Vestas (Denmark)

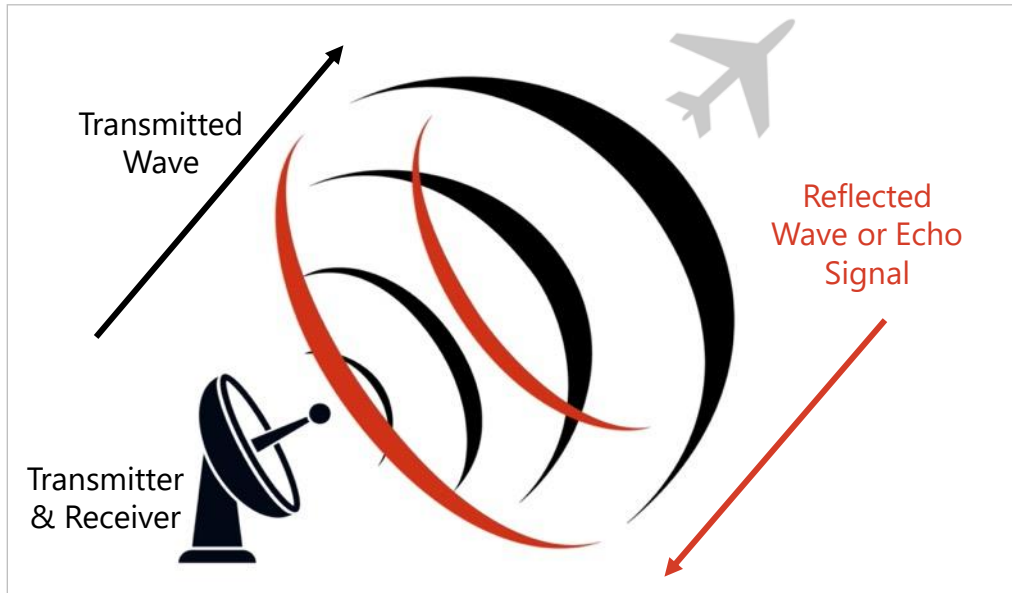


- Radar monitors the airspace around the wind farm for aircraft
  - When aircraft cross a pre-set perimeter, system issues a signal through the windfarm network to turn lights ON
  - When the aircraft exits the perimeter, system issues a light OFF command
- Various designs are available on the market
  - Ground-based & turbine-mounted sensors
  - Perimeter & in-field systems
  - Some systems incorporate secondary sensors such as aircraft transponder receivers (ADS-B)
- The objective of the technology is to minimize lights OFF periods while maintaining aviation safety
- DeTect's analysis of its 80+ US ADLS installations operating since 2009 shows the technology achieves on average 97% lights OFF

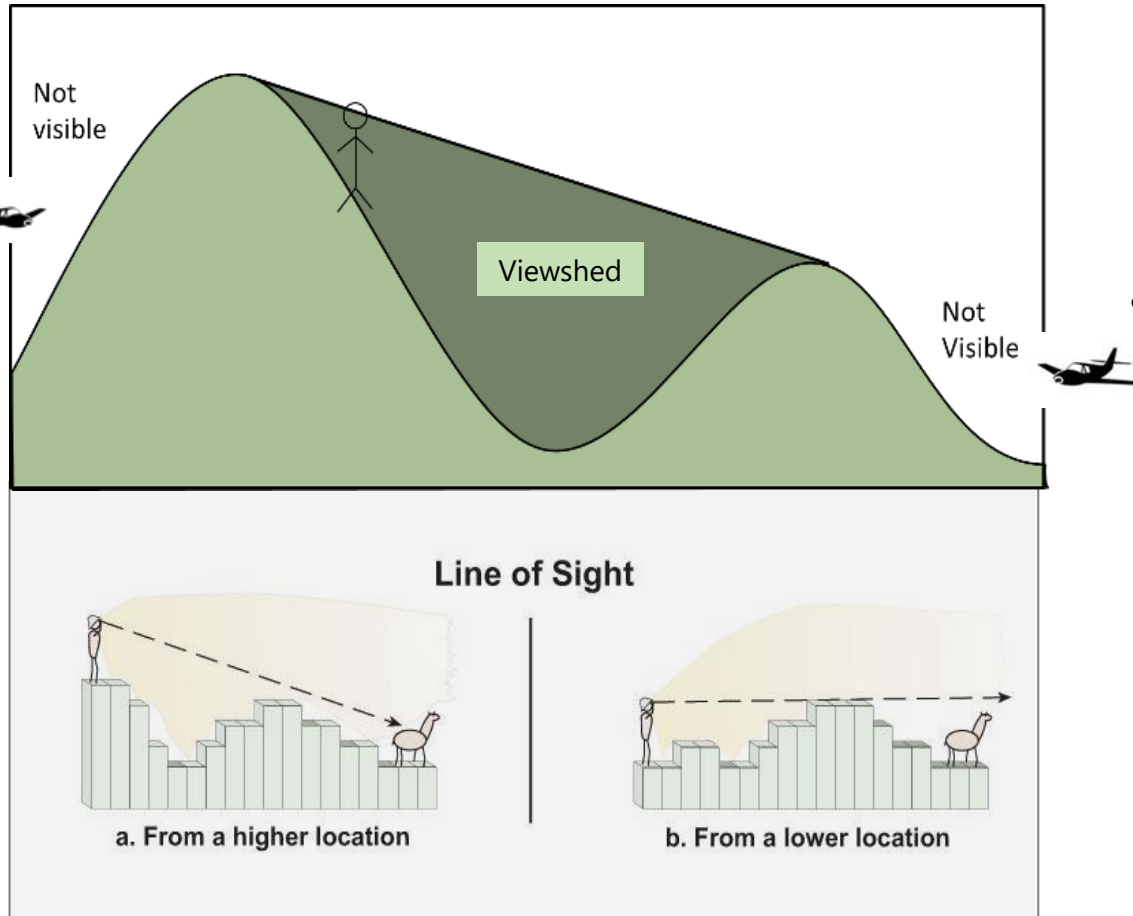
# Radar Basics



- Radar sends out a pulse of energy & measures the time it takes to reflect from a target & return to the radar antenna
  - The time it takes the pulse to reach the target provides the range

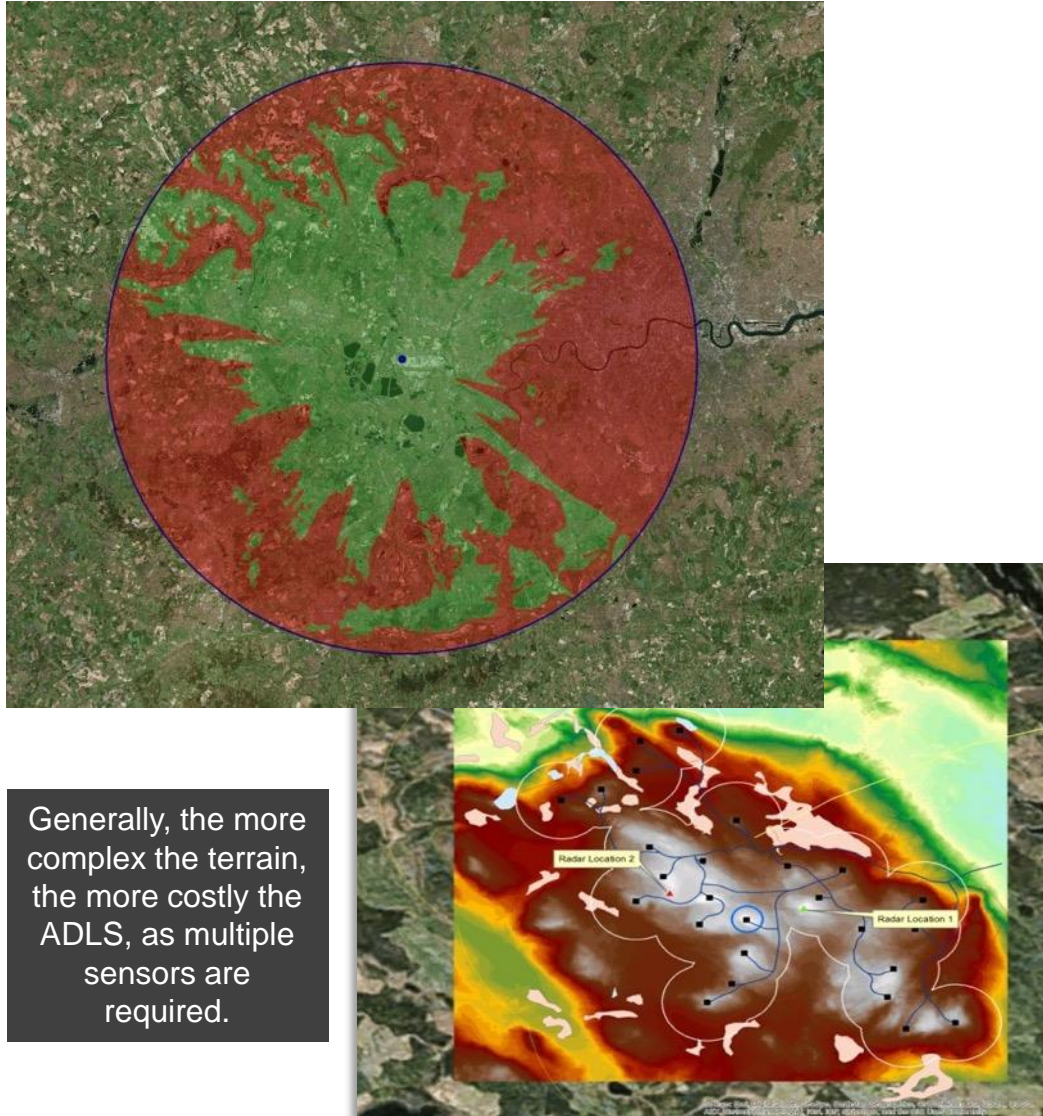


# Radar Basics



- Radar sends out a pulse of energy & measures the time it takes to reflect from a target & return to the radar antenna
  - The time it takes the pulse to reach the target provides the range
- Radar is a line-of-sight technology
  - Radar beam can be blocked by solid objects (terrain, buildings, heavily wooded areas, etc)
  - Not all locations are suitable for ADLS.
  - FAA has final determination on what FAA lights are on (each obstruction is evaluated).

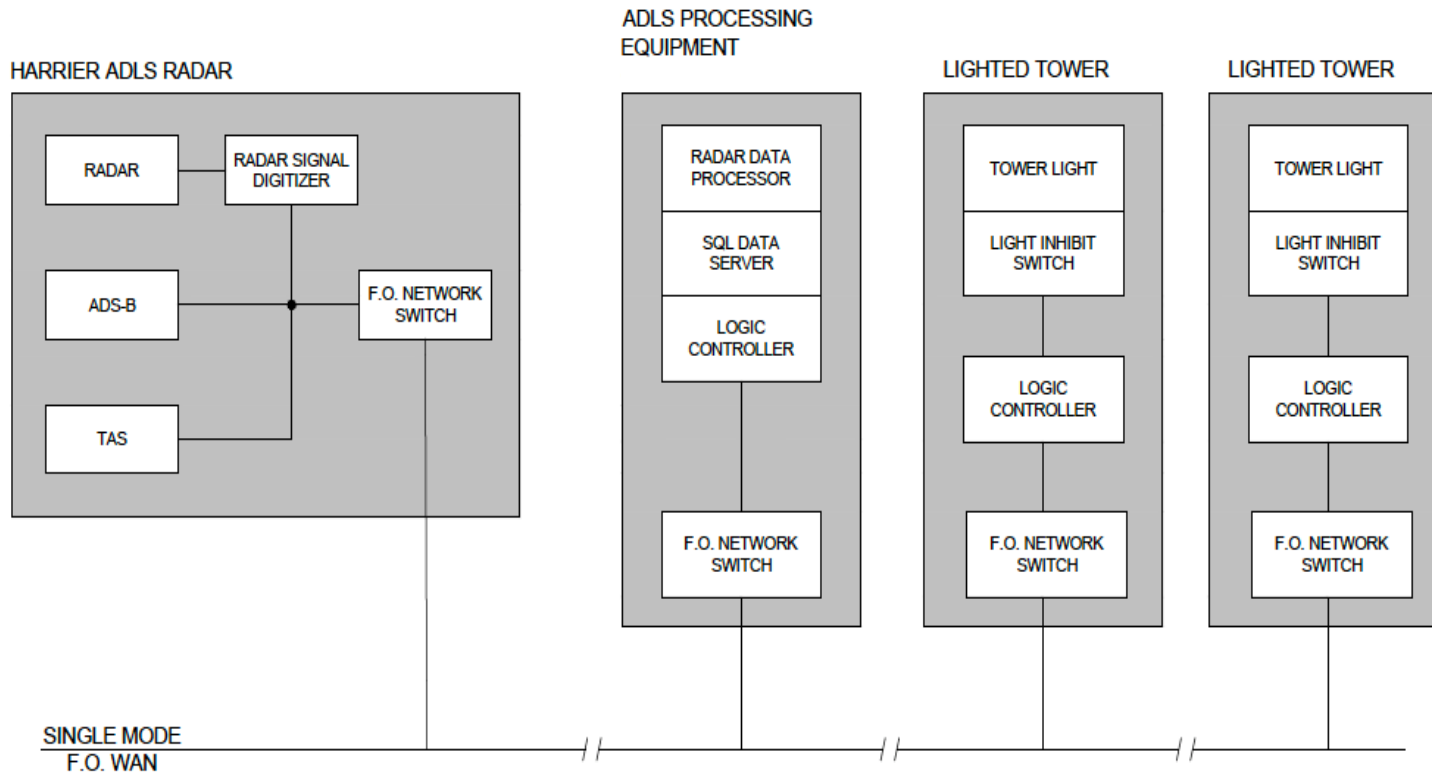
# Evaluating a Site for an ADLS



Generally, the more complex the terrain, the more costly the ADLS, as multiple sensors are required.

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- In evaluating a site for ADLS, an analysis of the site & surrounding area is done to verify that the radar can 'see' all airborne targets from 200 ft AGL to 1000 ft AGL above the highest obstacle
  - This analysis is normally done by the ADLS vendor & generates a site plan & viewsheds that are used in the Obstruction Lighting Plan that is submitted to the FAA
  - Some sites are not candidates for an ADLS due to viewshed issues, proximity to airports, economics & other factors

# ADLS COMPONENTS



- Radar sensor, processors & software
- Secondary sensor (ADS-B)
- ADLS Manager
- ADLS-compatible Obstruction Lights
- Light Control Modules (LCM)
- Infrastructure (radar tower, foundations, fencing, power, fiber)



# ADLS Cost – Rule of Thumb



- Most current obstruction lights are ADLS-compatible (can be connected to the windfarm network & controlled by the ADLS); older non-compatible lights must be replaced or upgraded.
- Once commissioned, it may take 1-3 months to fully optimize system operation & minimize lights ON periods.

Item	\$ 000's (US)
ADLS sensor, processors & software	\$ 500-600
Radar tower, foundation & installation	\$ 150-200
Power & fiber to radar sensor site	\$ 500-600
Commissioning, validation testing & optimization**	\$ 75-100
<b>Total per ADLS (installed &amp; commissioned)</b>	<b>\$ 1250-2000</b>
<b>Other costs:</b>	
ADLS-compatible lights / upgrades (per light)*	\$ 3-10
Operations & Maintenance (per year)	\$ 15-20



## QUESTIONS?

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