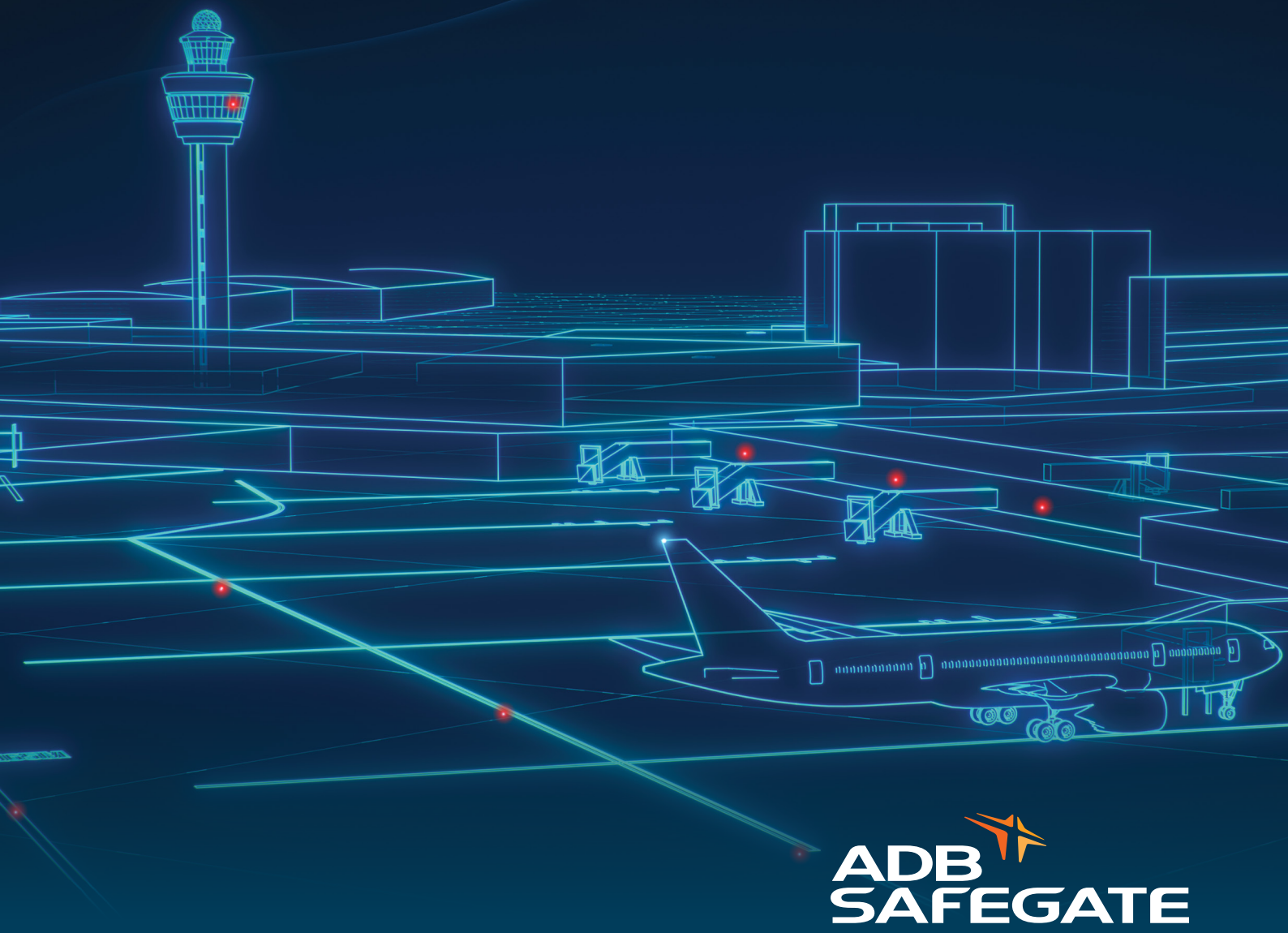
AIRSIDE 4.0®

Empowering the Airside Evolution

Airside 4.0® orchestrates a roadmap to true airside digitalization, delivering a smarter, more harmonized airside that will allow airports to increase airside availability, recognize operational savings, support sustainability goals, and improve safety.



ADB SAFEGATE

Transformation impact on airside operations

Digital transformation has impacted all industries in one way or another and can be compared in scale to the vast changes brought about by the fourth Industrial Revolution. But what benefits does digitalization bring to the airside, and how will it transform airside operations?

Many airports face similar challenges – a reduction in workforce, the need for improved situational awareness and safety, strategies to meet sustainability goals and demand for increased airside availability – to name only a few.

Digital transformation technologies, such as those offered by Airside 4.0®, have begun to solve these and other challenges.

Airside 4.0® technologies, the Internet of Things (IoT) and Edge Computing, powerful gateway communications, artificial intelligence, and machine learning, unleash the power of data, automation and predictability to provide airports with innovations for airside efficiency, sustainability and safety that can have transformational impact on airside operations.

Strategic Investment Analysis

	Tier 1 Large Hubs	Tier 2 Medium Hubs	Tier 3 Small Hubs
Purchasing	+5%	+7%	+21%
Installation	+3.10%	+7%	+21%
Visual Inspections	-48%	-46%	-44%
Routine Maintenance	-59%	-57%	-80%
Defect Reparation	-31%	-26%	-15%
Energy (Smart Usage)	-43%	-39%	-51%
System Management	+0.1%	+0.1%	+0.1%
TCO	**-12%**	**-8%**	**-13%**
ROI	**2.1 YRS**	**3.7 YRS**	**4.5 YRS**

Total Cost of Ownership (TCO) and Return on Investment (ROI) results are acquired from an ADB SAFEGATE investment calculation tool using average estimated costs/savings based on airport provided data

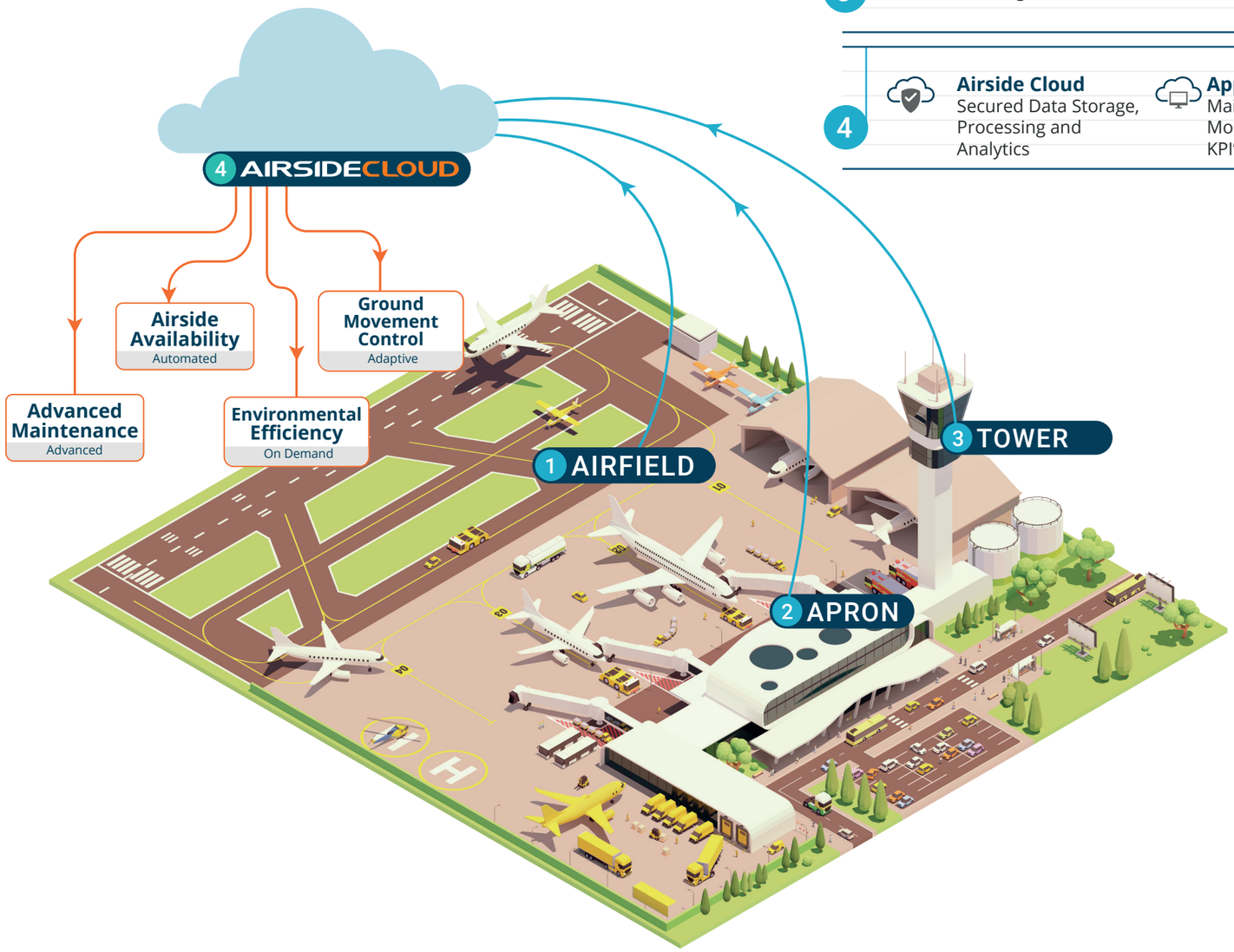
AIRSIDE 4.0® The Airside Ecosystem

1
- **Airfield Power** – Advanced Power Solutions
- **Airfield Lighting** – Intelligent Airfield Lighting
- **Weather** – Automated Weather Observation System (AWOS)

2
- **A-VDGS** – Advanced Visual Docking Guidance Systems
- **Apron Management** – Apron Management Applications
- **Apron Lighting** – High Mast LED Apron Lighting

3
- **Tower ICWP** – Integrated Controller Working Position
- **ALCMS** – Airfield Lighting Control and Monitoring System

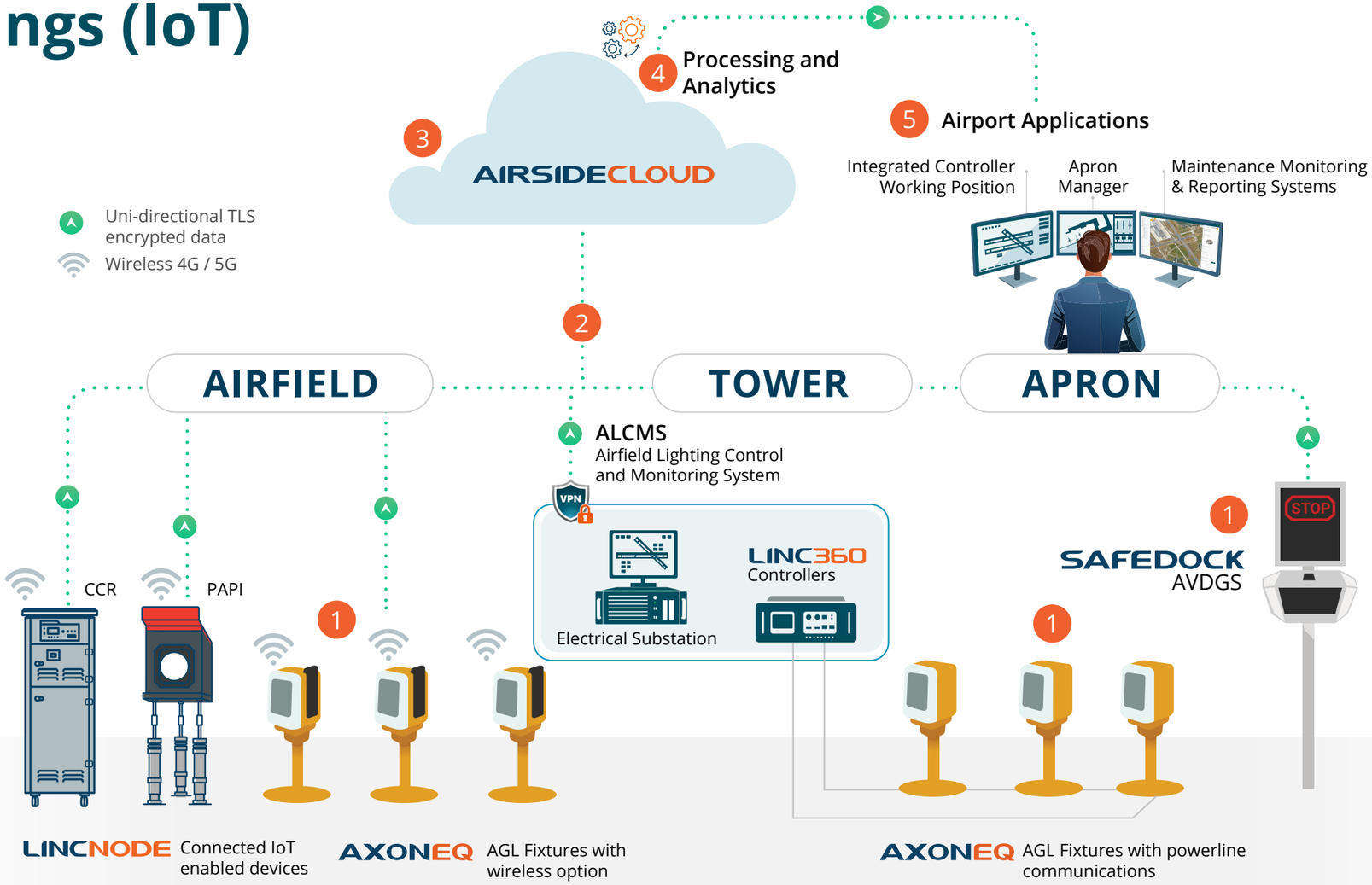
4
- **Airside Cloud** – Secured Data Storage, Processing and Analytics
- **Applications** – Maintenance, Remote Monitoring, Operational KPI's



The Internet of Things (IoT) role in Airside 4.0®

The Airside 4.0® foundation is the Internet of Things (IoT), where computers, devices, and other physical assets are interconnected, allowing digital data to be easily shared via different media without manual intervention. IoT consists of five main components regardless of its application:

1. IoT Devices or Things such as the Axon airfield fixtures and Safedock A-VDGS or existing equipment 'IoT enabled' using LINC Node.
2. The Gateway is the bridge or communications converter which provides the connection between the IoT devices and the cloud. The IoT gateway acts as a network router, routing the data between the IoT devices and the cloud.
3. The Airside Cloud is the secured location where all the asset and other streaming data is collected and stored. The cloud is where the real value is created allowing seamless data exchange with customers.
4. Processing & Analytics is the transformation of asset data into useful information the airport can visualize, monitor, and react to. The cloud provides scalable and powerful computational resources to meet the dynamic needs of airside operations.
5. The processed information can be embedded into existing ADB SAFEGATE Applications or viewed via cloud native web and mobile applications following latest IT Security standards.



IoT Terminology

SMART DEVICES

The Airside 4.0® journey begins with selecting the right IoT devices to obtain the data your airport needs. The ADB SAFEGATE **AXON EQ** are intelligent inset LED lights with built-in sensors which capture data essential to airport operators. The airfield lights and other devices like the **Safedock X** and **FleX** have embedded systems that convert the sensor data into digital data that is communicated via the gateway.

GATEWAY CONNECTIVITY

LINC360 is the latest generation of powerline communications equipped with an increased bandwidth to support high-capacity bidirectional secure data communications on the airfield series circuit. It also provides a future-proof communication platform allowing for Over the Air (OTA) updates to airfield lights and other connected intelligent IoT products adding new features and product updates as they are released.

4G LTE and 5G communications is also an option for the Safedock X, FleX and the AXON EQ elevated lights. This wireless option provides greater flexibility in installation locations for docking systems and reduce the costs associated with establishing or extending an airport's LAN.

LINC Node further expands an airport's connectivity strategies, by allowing airports to IoT enable other AGL or airfield support equipment (i.e. diesel generators) that they wish to extract data from. Even remote devices that are currently not monitored, like the LED PAPI, can be IoT enabled by adding the LINC Node which establishes a 4G wireless gateway to stream data to the cloud allowing for real-time remote monitoring

Working in harmony across four critical pathways

The Airside 4.0® strategy represents a transformative journey through four critical pathways outlined below. By integrating innovation with a proactive management approach, we're paving the way for smarter, safer, and more sustainable airside operations. From enhancing operational efficiency and reducing environmental impact to boosting airport throughput, our strategy underscores a comprehensive vision for the future.

This cohesive approach not only prepares us for current challenges but also ensures we remain at the forefront of the aviation industry's evolution, ready to embrace future opportunities while minimizing our environmental footprint and maximizing efficiency and throughput.

ADVANCED MAINTENANCE
Remote Monitoring
Connectivity Performance Analysis

Our commitment to deploying cutting-edge technologies aimed at enhancing the efficiency and reliability of airside operations.

By leveraging advanced monitoring and predictive maintenance, we aim to minimize the need for physical interventions, thus streamlining both equipment management and human resource allocation.

BASIC **ADVANCED**

EXPECTED OUTCOMES

- **Increased Operational Efficiency:** Less equipment downtime and quicker maintenance responses.
- **Cost Savings:** Proactive management lowers maintenance costs and emergency repairs.
- **Improved Safety and Reliability:** Better equipment reliability enhances airside safety.
- **Resource Allocation:** Allows staff to focus on value-added tasks, boosting engagement and efficiency.

AIRSIDE AVAILABILITY
Automated Reporting
Infrastructure Monitoring

Focusing on the critical aspect of overseeing and maintaining the infrastructural integrity of airside facilities.

This approach aims to guarantee continuous operational efficiency and enhance airside availability by providing comprehensive visibility and integrate automated reporting of the condition and serviceability of essential airside infrastructure.

MANUAL **AUTOMATED**

EXPECTED OUTCOMES

- **Enhanced Safety & Reliability:** Continuous airside infrastructure monitoring and maintenance.
- **Operational Efficiency:** Minimizes infrastructure disruptions, streamlining airport operations.
- **Strategic Infrastructure Investment:** Utilizes data analytics for informed airside investment planning.
- **Real-Time Infrastructure Insights:** Provides stakeholders with immediate status updates, allowing for proactive operational adjustments.

ENVIRONMENTAL EFFICIENCY
Analysis of Energy Statistics
Data-driven Airside Optimization

Aimed at driving energy efficiency across airside operations.

This initiative emphasizes the development and integration of innovative products, services, and solutions that target energy optimization, reduction in CO_2 emissions and other carbon reduction strategies, contributing significantly to environmental sustainability goals.

FIXED **ON DEMAND**

EXPECTED OUTCOMES

- **Energy Reduction:** Major cuts in airside energy use, lowering operational costs.
- **Lower Carbon Emissions:** Significantly decrease airside carbon emissions for sustainability.
- **Operational Efficiency Boost:** Smarter operational designs through intelligent energy management, means greater energy savings.
- **Sustainability Leadership:** Establish the airport as a model for aviation energy efficiency.

SAFE GROUND MOVEMENT CONTROL
Adaptive Lighting
Airside Safety

Focusing on elevating the efficiency, safety, and sustainability of aircraft surface movements and management.

By leveraging state-of-the-art technologies and strategies such as "Follow the Greens" and detailed turnaround tracking, this initiative aims to optimize the flow of ground traffic, ensuring smooth operations even under challenging conditions.

STATIC **ADAPTIVE**

EXPECTED OUTCOMES

- **Increased Airport Throughput:** Boost flight handling and open revenue opportunities with improved ground efficiency and better runway utilization.
- **Safer Operations:** Reduce ground incident risks with better aircraft surface movements and automatic conflict detection and resolution.
- **Eco-Friendly:** Decrease taxi congestion and ground operation emissions, adhering to sustainability goals.
- **Better Passenger Experience:** Quicker aircraft turnarounds improve on-time departures, enhancing passenger experience.

Harmonize your airside operations from touchdown to take-off

ADVANCED MAINTENANCE

AGL Fixture Seal Leakage
- AXON EQ AGL Pressure Sensor
- LINC360 Powerline Communications

Reduced Visual Inspections
- Precise Monitoring with Exact Location
- LINC360 Powerline Communications
- AGL Adjacency and % Alarm

Connectivity Performance Monitoring
- LINC360 Powerline Communications
- Wireless Infrastructure

Wireless Remote Monitoring
- LINC Node / IoT Enabled Devices
- Remote Alarming and Diagnostics

Docking System Statistics
- Safedock Docking Performance
- Advanced Analytics / Alarming
- Web Performance Dashboard

Remote LED PAPI Monitoring
- Alignment, Tilt and LED status
- Remote Alarming and Notifications

AGL Fixture Torque Management
- Wireless Angle Torque Wrench
- Angle of Rotation Trending

AIRSIDE AVAILABILITY

AGL Infrastructure Availability
- Automated AGL Monitoring
- AGL Alignment and Torque Status
- AGL Photometry
- CCR Monitoring

Optimized Deicing Management
- ATC, Ground and Deicing Coordination
- Aircraft Deicing Pad Arrival Times
- Optimized Resources, Refill Planning, Reduced Waiting Times

Apron Situational Awareness
- Surveillance
- Safedock / Video AI

Runway Category Conformity
- Runway CAT Conditions
- AGL Precise Monitoring

ENVIRONMENTAL EFFICIENCY

Airside Energy Utilization
- Status of Substation Constant Current Regulators Power
- Status of Safedock Power
- Power Usage Analytics
- Energy Consumption Dashboard and Reports

AGL Power Optimization
- Status of Substation Constant Current Regulators Power
- Visibility Conditions vs. CCR Brightness Step Analysis

Reduced CO2 Emissions / Noise
- Optimized Departure Sequence from Gate to Runway
- Reduce Waiting Times at the Runway Holdbar
- Reduced Taxi Times

SAFE GROUND MOVEMENT CONTROL

Runway Incursion Alerting System (RIAS)
- Surveillance
- Multi-sensor Data Fusion (MSDF)
- Adaptive Lighting / Stop Bar Safety Nets

Runway Status Lights
- Surveillance
- Runway Status Lights Automation

Adaptive Lighting (ADAL)
- A-SMGCS / Follow-the-Green
- Traffic Automation / Taxi Conflict Detection & Resolution

Pushback Support
- Selectable Pushback Options
- Automated Safety Nets
- Adaptive Lighting

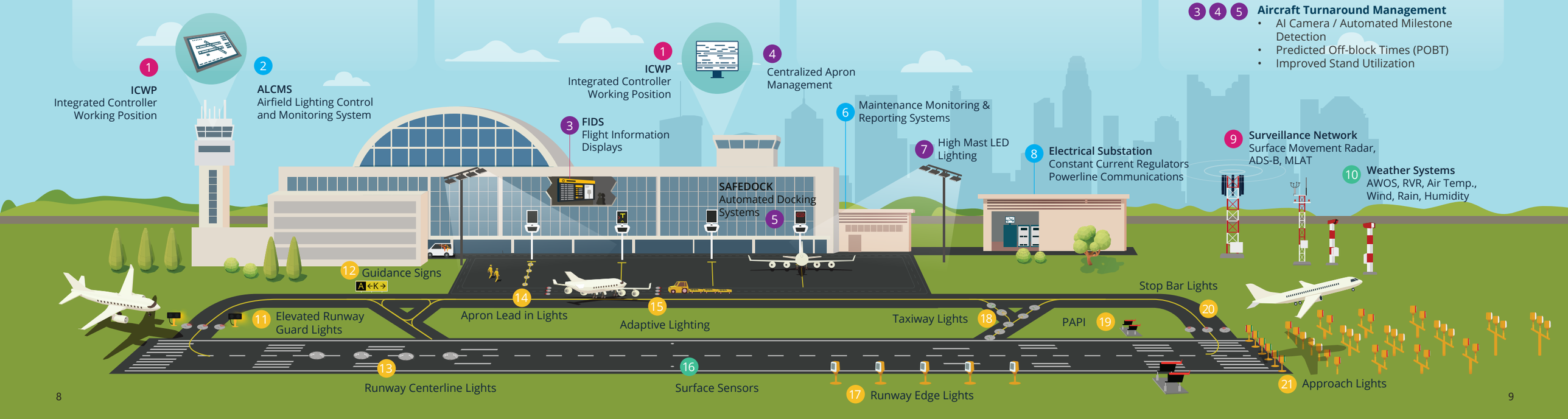
Automated Taxi Clearance
- Automated taxi routes
- Adaptive lighting

A-SMGCS Gap Filler
- Augmented Docking Surveillance
- Docking Safety Logic

Just-in-Time Autonomous Docking
- Aircraft Routing
- Adaptive Lighting
- FOD Apron Scan
- Automated Aircraft Docking

Automated Service Road Safety Lights
- Reduce Aircraft Waiting Times at Gate
- Automated Service Road Safety Lights
- Reduced Ground Handling Activity

Aircraft Turnaround Management
- AI Camera / Automated Milestone Detection
- Predicted Off-block Times (POBT)
- Improved Stand Utilization



About ADB SAFEGATE

A global player in delivering airport performance, ADB SAFEGATE aims to be the first-choice partner to airports, airlines and Air Navigation Service Providers by delivering integrated solutions that raise efficiency, improve safety, boost environmental sustainability and reduce operational costs.

With a portfolio spanning the airfield, gate, tower, terminal, and weather as well as industry-leading services, we help airports and airlines solve operational bottlenecks with innovative solutions from approach to departure.

Our Vision

A future of seamless, sustainable and safe airside operations.

Our Mission

We lead through innovation with smart, cost-effective and distinctive products, solutions and services to help our customers achieve more with less.

100+ Years of Experience	2,700+ Airports Served
175+ Countries Served	40+ Offices Worldwide
1,500+ Employees	45 Nationalities

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Visit the WIPO Brand Database for country-specific registrations of the Airside 4.0® trademark.

ADB SAFEGATE

www.adbsafegate.com